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An Analysis
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BASED ON CASES AT UNIVERSITY COLLEGE HOSPITAL, LONDON, IN ONE YEAR.

BY C. J. FULLER, D.M. OXF., M.R.C.P. LOND.,
PHYSICIAN TO THE ROYAL DEVON AND EXETER HOSPITAL: LATE MEDICAL REGISTRAR AT UNIVERSITY COLLEGE HOSPITAL.

THE series here presented was collected from the surgical wards of University College Hospital during 1927. As resident medical officer and later as medical registrar during that period I had unusual opportunities of examining the majority of the cases personally and thus avoiding the difficulties that arise in classifying observations made by others.

The total number of patients operated on during the year was 1478. The post-operative lung complications noted during that period are classified under the following headings:—

	Cases.
1. Bronchitis	24
2. Lobar pneumonia	2
3. Broncho-pneumonia	75
4. Broncho-pneumonia with empyema	1
5. Broncho-pneumonia followed by infarction of the lung	1
6. Abscess of the lung	4
7. Massive collapse	8
8. Infarction of the lung	9
Total	124

I have, as far as possible, excluded chest complications which were not directly due to the operative procedure and which would have developed whether an operation was performed or not, as, for example, in cases of osteomyelitis.

In order that there shall be no ambiguity as to the above classification, I propose to give a brief description of each form of complication, illustrated by typical examples taken from the present series.

BRONCHITIS.

This type of post-operative chest complication is closely associated with the broncho-pneumonic group, the more severe cases of bronchitis merging directly into the milder types of pneumonia. It is, therefore, difficult to draw any distinction between the two groups; consequently I have included any cases in which consolidation was doubtful under the present heading.

There were 24 cases, a number that is probably lower than it should be owing to the fact that some of the minor cases escaped notice. The onset was commonly during the first two days after operation. It was accompanied by persistent coughing or a desire to do so. The sputum was at first scanty, but after 24 to 48 hours was expectorated in moderately large quantity. It was muco-purulent in the majority of cases and the presence of blood was unusual. The physical signs consisted of scattered rhonchi throughout both lungs with a slight impairment of percussion note at the lung bases in a few cases.

Of the 24 cases, 20 occurred after abdominal operations, 2 following the removal of a growth from the pharynx and 1 after each of the following: thyroidectomy and nephrolithotomy. There was one death in this group—namely, after removal of a pharyngeal carcinoma (4·1 per cent. mortality). A necropsy was not allowed.

CASE 1.—A man, aged 46, admitted on July 2nd with a duodenal ulcer which had perforated four hours previously. The ulcer was oversewn and a gastro-jejunostomy performed. The anæsthetic was ether, given by the open method. The patient had a slight temperature on the day of operation and a few scattered rhonchi in his lungs. On the first day after operation the temperature was further raised and was maximal on the second at 101·5° F., the respirations being at the rate of 40 per minute. The physical signs were impaired resonance over an area at the upper part of the right lower lobe and scattered rhonchi throughout both lungs. The sputum was muco-purulent, but contained no blood. The temperature returned to normal on the fifth day and the patient made an otherwise uneventful recovery.

LOBAR PNEUMONIA.

This group differed from the next and largest one, the broncho-pneumonias, in many ways. There were two cases and the disease was in both severe in character and led to a rapidly fatal termination. The physical signs were those of a massive rather than a patchy consolidation. The sputum was copious and rusty in colour. It is worthy of note that at the time these cases occurred there was an epidemic of mild influenza in the wards and the one in which they were was closed soon afterwards on that account. Whether these two cases were instances of true influenzal pneumonia or of lobar pneumonia I am uncertain. They were, however, definitely in a different category from the broncho-pneumonic group. The following description is of one in which a necropsy was obtained.

CASE 2.—A man, aged 65, admitted on Jan. 19th suffering from an acute strangulated femoral hernia. He complained of a chronic cough. At the operation, which was performed under open ether anæsthesia, the hernial sac was found to contain a gangrenous piece of small intestine. This was resected and an entero-anastomosis performed. The temperature rose on the first day after the operation, the maximum being on the second (103°), the day of the patient's death. He was cyanosed and breathing at the rate of 40 per minute. The pulse-rate was 130. Examination of the chest showed signs of consolidation at both lung bases. There was no displacement of the heart. The sputum was copious, rusty, and frothy.

The *necropsy* was performed eight hours after death. Both lower lobes were airless, engorged with blood, and on section exuded a creamy mixture of blood and pus. Scattered about were numerous pale areas, raised, and consisting of necrotic lung tissue. The upper lobes contained air, and exuded blood and œdema fluid on pressure. The right lung was more affected than the left. The aorta, endocardium, and other structures were stained a bright red. Sections of the lungs showed the alveoli to be filled with exudate containing large numbers of leucocytes, Gram-positive diplococci, and short-chained streptococci. In some places the alveolar wall was disappearing.

BRONCHO-PNEUMONIA.

The third is by far the largest group of the series and consisted of 75 cases. It is from the numbers of this type that the percentage incidence of post-operative chest complications is higher than in any recently published series. All cases included under this heading showed unmistakable signs of pneumonic consolidation either clinically or in the post-mortem room. Clinically the condition was recognised by inpaired resonance to percussion, weak or tubular breath sounds, râles, and an alteration in the vocal resonance, which was sometimes aegophonic and at others diminished. This consolidation was, without exception, found in the lower lobes of one or both lungs. In many cases it was associated with a diffuse bronchitis.

The course of the disease was characteristic. There was a moderate rise of temperature on the first or second day after the operation accompanied by a corresponding increase in the pulse-rate. The respirations were quickened to a slightly greater degree, as would be expected in a pneumonia. The patient at this period often complained of a tight sensation in the chest and a desire to cough, which he was unwilling to gratify owing to the resulting pain in the operation wound. The onset was in some cases delayed to the third, and in one case to the fifth, day after operation. The temperature fell by lysis and in uncomplicated cases had returned to normal by the sixth to tenth day. The sputum was as a rule copious, purulent, and contained no blood visible macroscopically.

A point of interest is the rapidity of the onset in this type of post-operative complication. It would not be justifiable to claim the rise of temperature on the first day after the operation as due to the chest condition, but there can be no doubt that a

fully developed pneumonia can be present on the second day, as is shown by Case 3 quoted below.

In Table I. I have placed the first and second days together owing to the difficulty of distinguishing a reactionary temperature due to the operation from that caused by the pneumonia.

TABLE I.

Day of onset.	Number of cases.
First and Second	69
Third	2
Fourth	0
Fifth	1
Doubtful	3
Total	75

This complication occurred after two main classes of operation, the first being those involving the anterior abdominal wall and by this route the peritoneal cavity, in particular the upper abdomen, the second being major operations on the mouth, pharynx, and upper respiratory passages.

Table II. gives the incidence of broncho-pneumonia in the present series:—

TABLE II.

Operation.	Cases	Pneumonias.	Deaths.	Mortality % of morbidity.
Abdominal	610	58 (9·5%)	9 (1·4%)	15·8
Mouth, pharynx, and larynx	52	9 (17·3%)	9 (17·3%)	100
Bladder and prostate (suprapubic)	34	3 (9·0%)	1 (2·9%)	33·3
Miscellaneous	—	5	2	40
Total	—	75	21	28·0

CASE 3.—Male, aged 41, admitted on August 2nd, 1927, complaining of acute pain in the abdomen. Operation showed a perforated duodenal ulcer; this was oversewn. The anæsthetic was ether, given by the open method. Nothing abnormal was detected in the heart and lungs before operation. There was no previous history of chronic chest trouble.

The temperature rose to 99·4° F. on the first day after operation. The maximum was 101° F. on the second day. It had returned to normal by the fifth day. The maximum respiration-rate was 40 per minute. Examination of the chest showed diminished movement, impaired percussion note, and weak breath sounds at the right base behind. Râles were heard at both bases, and the vocal resonance at one spot at the right side was nasal in character. The sputum was scanty and purulent. Patient died on the seventh day.

Post mortem.—The lungs showed very severe broncho-pneumonia at the lower and posterior parts of both lower lobes. The mucous membrane of the bronchi was hæmorrhagic. A small amount of sero-fibrinous fluid lay between the coils of gut and the stomach showed evidence of recent and old gastritis. The ligatures closing the ulcer were holding well. Sections of the lung showed severe, almost confluent, broncho-pneumonic consolidation, the alveoli being filled with exudate containing large numbers of polymorphonuclear leucocytes and many red blood-cells. The bronchi were filled with pus.

Case 3 is a typical example of one following abdominal surgery. There is little doubt that the peritonitis contributed to the fatal termination, but the clinical and post-mortem findings of a broncho-pneumonia at the posterior parts of the lung bases is the characteristic feature of the group in general. Microscopically, the appearance is indistinguishable from the so-called hypostatic pneumonia occurring in patients dying from such conditions as cerebral hæmorrhage and wasting diseases, and it appears to me that the clinical signs bear a close resemblance to one another.

Complications of Broncho-pneumonia.

(*a*) *Empyema.*—There was one case of empyema in the series—a man with an epithelioma of the tongue. The operation was done in two stages, the first a gland operation, the second for removal of the growth. The first operation was performed without any complications, but ten days after the second an empyema was diagnosed, opened and drained. The patient died seven weeks later from general dissemination of the growth.

(*b*) *Infarction.*—The following case is interesting in that it exhibits two types of post-operative lung complication.

CASE 4.—The patient was a woman, aged 58, operated on for carcinoma of the pyloric end of the stomach. After the operation she developed a typical post-operative broncho-pneumonia, which had almost resolved by the eighth day after operation. On the ninth she developed a femoral thrombosis, and three days later pain in the right side of the chest, blood-stained sputum, and later a well-marked friction rub.

(*c*) *Pulmonary Abscess.*—There were three such cases complicating broncho-pneumonia, but I am including one other, which I believe to be the sequela of a pulmonary infarction, making the group up to four. Three followed upper abdominal operations and one the drainage of a perinephric abscess. In the case of those complicating broncho-pneumonia, the course was typical of that condition for the first few days. Subsequently the temperature did not fall to normal as in an uncomplicated case, and examination of the chest showed signs of cavity formation confirmed radiologically in each instance.

CASE 5.—A man, aged 41, admitted on August 18th suffering from a duodenal ulcer. His lungs were emphysematous. A posterior gastro-jejunostomy was performed under open ether. The operation lasted 43 minutes. The patient had an acute dilatation of the stomach on the first day after operation. He was treated with subcutaneous saline and improved. On the fourth day after operation his temperature rose to 103·4° F., with a gradual downward trend until the thirty-second day, when it reached normal. On examination at the onset of the pneumonia the physical signs were a slight impairment of percussion note at the left base with weak breath sounds at both. The cardiac dullness was diminished, and the air entry below normal over the front of the chest owing to the emphysema. Two days later the breath sounds had decreased still more at the bases, particularly on the left side. The sputum was scanty and muco-purulent. In a further three days' time the breath sounds had become inaudible and the patient was expectorating a foul-smelling, brown-coloured sputum. From that time the signs gradually became less marked, and the patient improved. A radiogram showed a small circular shadow at the left base which in subsequent pictures became less opaque. The sputum contained pneumococci and a coliform bacillus on culture.

MASSIVE COLLAPSE.

Of the next type of complication—namely, massive collapse—there were eight cases in the series. The main physical sign on which I based my opinion was the displacement of the heart towards the side of the lesion, and without this cardinal sign of the condition I did not feel justified in making the diagnosis.

The onset was characteristic. Within three or four days of the operation the patient's temperature rose suddenly. He complained of a tight feeling in the chest and appeared to find some relief by lying on the affected side. Physical examination showed displacement of the heart towards the side of the lesion, with diminished movement, impaired percussion note, and weak or absent breath sounds. These signs remained unchanged, with the exception of the breath sounds, which frequently became of a tubular quality associated with an ægophonic vocal resonance. The temperature fell to normal again in the course of about a week, but signs of the collapse persisted for several days longer. Radiographically, displacement of the mediastinal contents was well shown with a uniform shadowing of the affected lobe of the lung. The sputum was purulent, somewhat viscid, and varied in amount. A detailed description will be found in W. Pasteur's [1] classical paper in which he points out the frequency of the condition following operations.

In the present series this complication occurred five times after an abdominal operation, twice after nephrectomy, and once after hemilaryngectomy. The last case was not diagnosed until the autopsy: death took place on the second day.

The following is given as a typical example of massive collapse.

CASE 6.—The patient was a girl, aged 15, admitted on Nov. 22nd, with signs of obstructive uræmia. She had

passed little urine for several days before admission. The pulse-rate was rapid, and examination of the lungs revealed the presence of generalised bronchitis.

The day after admission she began to pass large quantities of urine and improved rapidly. A radiogram of the renal tract showed stones in both kidneys.

Three weeks later the stone of pure cystin was removed from the left kidney under open ether anæsthesia. Her temperature rose on the first day after the operation and remained above normal for six days, the maximum being 103° F. On the fourth day she complained of considerable pain and a sensation of tightness in the left side of her chest. Examination on the following day showed marked displacement of her heart to the left, diminished movement, dullness, and tubular breath sounds at the left lung base. These signs cleared slowly. The sputum was small in quantity, purulent, and viscid.

INFARCTION.

The last group of the series comes into a totally different category, and I have included them in the present paper in order to emphasise this difference. Although they are undoubtedly post-operative chest complications, they fall into the group of pulmonary embolisms, which in the grosser forms are so fatal. The point of difference which I particularly wish to emphasise is the period which elapses between the operation and the occurrence of the condition. In no case of the nine in the series did this complication arise before the seventh day. The onset was marked by a sharp, stabbing pain in the chest made worse by taking a deep breath, and coincident with this there was a slight rise of temperature for two or three days. The sputum, if present, was scanty and stained with bright red blood. Examination of the chest showed the presence of a friction rub, with a slight impairment of percussion note over the same area in the more severe cases. The following is a typical example.

CASE 7.—A man, aged 55, admitted on Dec. 12th for removal of the gall-bladder for cholecystitis. The operation was performed under open ether anæsthesia. The convalescence was uneventful until the fourteenth day, when he was seized with a sharp pain in the left side of his chest. There was a slight rise of temperature for five days, and a small amount of sputum was expectorated. Examination of his chest revealed the presence of a friction rub on the left side.

PREDISPOSING CAUSES.

Table III. gives an analysis of the number of chest complications, excluding pulmonary infarctions, occurring after various operations. The percentage in this series is considerably higher than in any other recently published. But as Churchill [2] points out there has been a tendency for the numbers to rise during recent years, probably on account of a more careful study of the condition.

Site of operation.—As all other investigators have found, the type of operation which is most frequently followed by post-operative chest complications is the one involving the upper abdomen. In the present series there were 181 operations, of which 41 were followed by a lung complication (22·6 per cent.). On closer analysis of this group it was found that the highest percentage was given by the perforated peptic ulcers (40 per cent.), the next by the other operations involving the stomach and duodenum (28·7 per cent.), excluding gastrostomy. This latter operation was in every case performed under local anæsthesia, was relatively of short duration, and the amount of shock was small.

The lower abdominal operations were the other large group in which lung complications were common. Here, although the total number of complications is greater than that in the upper abdominal group, the percentage is slightly less than half (10·9 per cent.). The other types of operation following which a high percentage was noted were renal operations (11·4 per cent.), prostatectomies (8·8 per cent.), and operations on the mouth, pharynx, and upper respiratory passages (25 per cent.). It is noteworthy that in the case of radical amputation of the breast, thyroidectomy, and major head operations, the incidence was extremely low, being in the first two instances only 2 per cent., and in the last 5 per cent. These figures are significant in that they refer to operations which are as a rule lengthy and in the case of the breast involve the exposure of a large area of tissue.

TABLE III.

—	—	No. of cases.			Chest complications. Number.			Chest complications. Percentage.			Mortality.	
		Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	Per cent.
A.	Upper abdominal—											
	1. Perforated gastric or duodenal ulcer	20	19	1	8	7	1	40·0	36·8	100	1	
	2. Other gastric operations	94	70	24	27	22	5	28·7	31·4	20·8	3	
	3. Operations on the biliary apparatus	36	9	27	5	0	5	13·9	0	18·5	2	
	4. Splenectomy	4	3	1	1	1	0	25·0	33·3	0	0	
	5. Gastrostomy for carcinoma of œsophagus	23	20	3	0	0	0	0	0	0	0	
	6. Others	4	3	1	0	0	0	0	0	0	0	
	Total	181	124	57	41	30	11	22·6	24·2	19·3	6	3·3
B.	Lower abdominal—											
	1. Appendicectomy (acute)	107	65	42	14	12	2	13·1	18·4	4·7	2	
	2. Appendicectomy (chronic)	44	19	25	5	3	2	11·3	15·7	8·0	0	
	3. Umbilical and ventral herniæ											
	(*a*) Strangulated and internal strangulation	8	4	4	3	3	0	37·5	75·0	0	1	
	(*b*) Non-strangulated	20	9	11	1	0	1	5·0	0	9·0	0	
	4. Inguinal and femoral herniæ—											
	(*a*) Strangulated	18	11	7	4	4	0	22·2	36·3	0	2	
	(*b*) Non-strangulated	132	98	34	14	12	2	10·6	12·2	5·8	0	
	5. Laparotomies (various)	100	51	49	6	5	1	6·0	9·8	2·0	0	
	Total	429	257	172	47	39	8	10·9	15·2	4·6	5	1·1
C.	Rectum and anus (perineal route)	49	31	18	1	1	0	2·0	3·2	0	0	0
D.	Bladder and prostate (suprapubic)	34	34	0	3	3	0	8·8	8·8	0	1	2·9
E.	Kidney and ureter (lumbar incision)	35	17	18	4	2	2	11·4	11·8	11·1	0	0
F.	Radical amputation of breast	46	0	46	1	0	1	2·2	0	2·2	0	0
G.	Partial thyroidectomy	52	5	47	1	0	1	1·9	0	2·1	0	0
H.	Major head operations, excluding section "I"	20	?	?	1	0	1	5·0	?	?	1	5
I.	Major operations on mouth, pharynx, and larynx	52	39	13	13	12	1	25·0	30·8	7·7	12	23·1
J.	Miscellaneous	580	?	?	3	3	0	0·5	—	—	1	0·17
	Grand total	1478	507*	371*	115	90	25	7·8	—	—	26	1·8

* These figures are incomplete, as I considered it unnecessary to give the number of male (M.) and female (F.) cases in this category.

From these data it appears clear that there are two classes of operation which have the greatest number of chest complications—namely, those involving the peritoneal cavity and those on the mouth, pharynx, and the upper respiratory passages. To this generalisation there is one exception, the operations on the urinary tract. These have been divided for purposes of classification into two groups, upper and lower. In the case of the former the explanation appears to be that the operation necessitates interference with structures in close proximity to the diaphragm and with the muscles employed in the act of coughing (latissimus dorsi).* In the latter instance operations such as prostatectomy are often of necessity undertaken in cases where there is severe damage to renal function. It is well known that such a condition is a predisposing factor towards the development of pulmonary infections.

Lowered resistance.—Operations in which the peritoneum was opened show that, the patients in whom it would be reasonable to expect a considerable amount of shock before operation—to wit, the "acute abdomens," are those in whom the incidence is high when compared with operations of a similar nature when conditions are most favourable. The difference is well shown by a comparison of the case incidence between perforated peptic ulcers (40 per cent.) and other gastric operations (28·7 per cent.); and again by strangulated ventral and umbilical hernias (37·5 per cent.); and similar cases where there was no strangulation (5 per cent.). There is only a negligible difference between appendicectomies whether performed for an acute or chronic condition. This is intelligible, as the shock in a patient suffering from an acute appendicitis is not marked when those cases which have progressed to a general peritonitis, an uncommon complication, are excluded.

Preoperative lung infection.—The presence of an infection of the lungs before operation appears to be of considerable importance as a possible ætiological factor. There were no notes relative to this point in 37 of the 115 cases (infarctions excluded). I was able to discover a history of either recent or long standing respiratory tract infection in 40 (35 per cent.), and in 23 of the 41 cases physical signs of such an infection were found in the lungs before operation. Amongst other investigators Elwyn [3] has noted a high percentage (25) of preoperative lung complications.

Time of year.—The monthly incidence of complications taken throughout the year in this series gives little information of value owing to great variations from month to month. If, however, the six winter months, October to March (inclusive), are compared with the corresponding summer ones, an appreciable difference is found, there being 65 in the former and 50 in the latter.

Age incidence.—An analysis of the age incidence of post-operative chest complications reveals the fact that in upper abdominal operations 39 per cent. occur in the fifth decade. The majority of this group were patients suffering from gastric or duodenal ulcers, a condition which occurs at a slightly earlier age. The lower abdominal had a more diffuse maximum, 23·4 per cent. occurring in both the fourth and sixth decades and 17·5 per cent. in the fifth. This group included a varied assortment of operations formed in large part by cases of appendicitis and inguinal and femoral hernias. I show these data in Table IV. Abdominal operations only are given as the other groups are not sufficiently large to serve any useful purpose.

From these observations it appears that one is not justified in drawing any definite conclusions as to the part which age plays in predisposing towards the condition. There is no doubt that it is uncommon before the age of 20, but it is equally true that the type of operation, following which this complication is most common, is more frequently performed in the subsequent decades. Nevertheless, I think one may say that age, in so far as it diminishes the power of an individual to withstand the ill-effects of an operation, has a predisposing influence towards lung complications.

TABLE IV.

Age in years.	Number of cases.	
	Upper abdomen.	Lower abdomen.
0 to 9	0	0
10 to 19	1	5
20 to 29	4	11
30 to 39	9	8
40 to 49	16	11
50 to 59	9	5
60 to 69	1	5
70 to 79	0	0
80 to 89	0	1
doubtful	1	1
	Total 41	Total 47

Length of operation does not seem to bear any intimate relation to the occurrence of the condition, as is shown by the fact that there was an incidence of 13·1 per cent. in acute appendicitis and 10·6 per cent. in the case of non-strangulated inguinal and femoral hernias, whereas radical amputation of the breast and partial thyroidectomy, both severe and relatively lengthy operations, had a percentage of only 2·1 and 1·9 respectively. This difference may be accounted for in part, but certainly not wholly, by the fact that the latter two groups were largely female.

Sex Incidence.—This brings me to the observation made by many previous observers that the condition is more common in males than females. In this series, of the 115 cases 90 were males and only 25 females. These figures are rather misleading, however, as the number of operations of a type that was followed by chest complications was greater in the former (504) than in the latter (369). The incidence, therefore, was 17·8 per cent. and 6·8 per cent. respectively.

Anæsthetic.—Table V. gives the number of anæsthetics given during the year with the corresponding number of chest complications following each. The custom at this hospital is to administer ether in some form or other unless it is contraindicated. The percentages, therefore, must not be taken at their face value, as gas-and-oxygen or local anæsthetic was given to a few cases for the very reason that a lung complication was to be feared after the operation.

TABLE V.

Anæsthetic.	Cases.	Chest complications excluding infarctions.	Per cent.
Ether	1332	93	6·9
Chloroform ..	204	14	6·8
Local and regional	179	7	3·9
Gas-and-oxygen ..	16	1	6·2
Total.. ..	1731	115	—

The number of cases in which gas-and-oxygen was employed is too small for any reliable conclusions to be drawn. In this class I have not included any minor operations such as tooth extraction, as I considered that such operations had no place in such a series. This will explain the otherwise inexplicably small number in which nitrous oxide was used.

Of the 14 cases in which chloroform was used no less than eight were operations on the mouth, pharynx, and larynx, sites which have been previously shown to be frequently followed by respiratory complications. There were four instances in abdominal operations, but the age, 82, in one of them would probably be prejudicial to an uncomplicated convalescence.

* This suggestion is borne out by the observations of the sisters in charge of the wards, who, owing to the nature of their work, have an unrivalled opportunity of watching the patients.

Local and regional anæsthesia was followed by broncho-pneumonia or bronchitis in seven instances. Of these, four had definite evidence of preoperative abnormality in the chest and two a suggestive history, although nothing abnormal could be found. The operations were of the lower abdominal type in all but one case.

Reference to Table V. shows that regional and local anæsthesia is followed by chest complications in 3·9 per cent. of cases as compared with 6·9 per cent. after ether, but a strict comparison cannot be made on account of the small number in the former.

Mode of Infection.

There appears to be little difference of opinion between various observers as to the variety of post-operative lung complications that may occur. To put them briefly there are the pneumonias, the lobular type being by far the most common, with their attendant complications, such as abscess, empyema, and delayed resolution, which, together with bronchitis, form the majority of the cases. In a rather more doubtful group are the cases of massive collapse, and finally there are the undoubted cases of infarction of the lung.

Taking the group of bronchitis, broncho-pneumonia and its complications, it is obvious that there must be some source from which the infection arises. There are two possible theories: (1) that the infecting organisms are carried to the lung from the site of operation; (2) that the organisms are already present in the lung, or gain access to the lungs by the respiratory tract.

The supporters of the first theory must be divided into two groups. Cutler and Hunt [4] hold that the infection is carried by numerous small emboli either by the blood stream or the lymphatics from the site of operation. From the fact that the condition is most frequent following abdominal surgery they suggest that the continual movement of the anterior abdominal wall necessitated by the act of respiration serves to dislodge these emboli from the smaller vessels. This bombardment of the lungs by these infected emboli sets up an inflammatory reaction, which results in post-operative broncho-pneumonia. Razemon,[5] on the other hand, holds the view that the infecting organisms gain entrance to the lung by a lymphatic route. He points out the great number of cases which follow upper abdominal surgery, particularly operations on the stomach and duodenum, and claims to have isolated organisms from the sputum of patients suffering from post-operative pneumonia which are characteristic of that part of the alimentary tract. He suggests that the infecting organisms pass by means of the diaphragmatic lymphatics and thence through the thoracic duct to the great veins in the neck. From there they pass through the right side of the heart to the lungs, where they are filtered out. In support of the hypothesis he repeated the experiments of Bolton [6] and others on the absorption of bacteria and other minute particles by way of the lymphatics of the diaphragm.

The embolic theory put forward by Cutler and Hunt [4] would seem to meet with several objections. There is a class of post-operative lung complication which is undoubtedly due to embolism of a minor degree and which is described in papers on that subject in the same group as the cases of pulmonary embolism which result in sudden death (Lockhart-Mummery).[7] In the present series I have collected nine such cases. They have a well-known clinical course and tend to come on during the second week of convalescence from operation in the majority of cases. In this series there was not one which appeared before the seventh day.

There is no definite evidence as to the origin of the emboli. Whether they arise from the veins near the site of operation or from those of the pelvis or lower limbs has not yet been settled by the investigators of this question, but it appears to me that the picture presented by this type of case is different in many respects from that shown by post-operative broncho-pneumonia. The latter condition appears in a remarkably short time after the operation, is not characterised by the acute onset of a pulmonary infarct, and the signs and symptoms of pleurisy are rather the exception than the rule. Again, the sputum, although blood-stained in a few cases, is expectorated in moderately large quantities, and is definitely purulent in all cases.

The appearance produced by septic emboli in the lungs is nowhere better illustrated than by those cases of suppurative phlebitis of the lateral sinus following mastoiditis, or again by some cases of osteomyelitis which come to a fatal termination. Here multiple abscesses are found scattered throughout both lungs, and there would appear to be no predilection for the bases.

Armstrong and Gaskell [8] in their researches on the pneumococcal infection of the human lung state that in their opinion both lobar and broncho-pneumonia are air-borne infections, and that the factors determining the type which occur are the virulence of the infecting organism and the resistance of the host. A blood-borne infection of the lung by pneumococci they term miliary pneumonia. In this type changes in the bronchioles or bronchi are either absent or slight in comparison with those in the alveoli. These conclusions are supported by histological evidence and experimental production of pneumonia in rabbits by intratracheal insufflation of varying strains of pneumococci. From these facts it would seem unlikely that multiple embolism will explain the pathogenesis of post-operative pneumonia.

It appears to me that the grounds on which Razemon [5] bases his conclusions are also inadequate, as the bacteriological study of sputa obtained from patients who have recently undergone an operation is of little value. The organisms of the upper alimentary tract will in all probability be present from post-operative vomiting whether the patient be suffering from pneumonia or not.

The other possible mode of entry for infecting organisms is by the respiratory tract. In the first place, no one will deny that the inhalation of septic material into the respiratory passages is capable of producing an extremely severe type of pneumonia. This is well exemplified by the cases of post-operative pneumonia following operations on the mouth, pharynx, and larynx. The numbers are admittedly small, but the percentage (25) is sufficiently high to be worthy of note. Again, there is definite clinical evidence of a pre-existing chest infection in 19·6 per cent. of the 115 cases in this series and a history of either recent or chronic infection in no less than 35 per cent. Therefore it will be seen that there is a considerable number of cases in which one is justified in assuming a respiratory tract infection either before, during, or after the operation. There must be, however, other factors, and in attempting to find an explanation I was struck by the closely analogous condition of so-called hypostatic pneumonia. This type of inflammation of the lungs occurs, as is well known, in cases of wasting diseases frequently unconnected with the respiratory system.

The reason is apparent. In these cases we have patients who are for some reason or other unable to withstand a respiratory tract infection which has manifestly not arisen from any operative procedure, and there is no reason to suppose that they were infected from without by pathogenic micro-organisms. The cases are those of patients enfeebled either by old age, a chronic wasting disease, or a severe illness. In addition, such patients lie still in bed with the minimum amount of movement and take extremely shallow respirations. I would particularly emphasise instances of diaphragmatic paralysis and quote the following example at length:—

Case 8.—A man, aged 22, who was admitted on Oct. 20th, 1926, suffering from acute anterior poliomyelitis. On admission there was complete paralysis of both legs and the right arm, which had been present for four days. Twelve hours later the paralysis had involved the diaphragm, and respirations were carried on by weakly acting intercostal

and the accessory respiratory muscles. The patient was breathing rapidly and was extremely cyanosed. He died two hours later.

Post mortem, the lungs showed numerous hæmorrhages and some emphysema. There was a blood-stained froth in the trachea. The bases showed a patchy broncho-pneumonia and subpleural collapse. Heart normal. Congestion of the liver. Brain showed congestion of the blood-vessels and a few subarachnoid hæmorrhages.

Sections of the lungs showed a hæmorrhagic broncho-pneumonia.

The changes in the brain and cord were typical of anterior poliomyelitis and polio-encephalitis.

Here it will be seen that a broncho-pneumonia was present in addition to the small areas of collapse. Pasteur [1] has emphasised the occurrence of the latter condition in similar cases, especially in post-diphtheritic diaphragmatic paralysis.

It would appear that the procedure involved in operations, particularly those on the upper abdomen, tends to reproduce the conditions necessary for the production of such a pneumonia. The patient has been subjected to treatment which tends to lower his resistance to any infecting organisms present in his respiratory tract, and on recovering from the anæsthetic is conscious of a pain in his abdomen which is made worse by any attempt at coughing or taking a deep inspiration.

The respiratory movements which are most involved are those of the diaphragm, which, as was shown by Keith,[9] are responsible for the ventilation of the bases and posterior parts of the lungs, and it is this movement which is especially painful to patients who have undergone an upper abdominal operation. It is interesting to note the relatively high percentage (11·4) of post-operative complications following renal operations, which involve the structures in the region of the pillars of the diaphragm and the latissimus dorsi muscles. Drummond,[10] in 1898, notes that patients who made the most successful attempts at coughing made the best progress.

In support of the contention that inhibition of the diaphragmatic movements occurs may be cited Churchill and McNeil's[11] observations on the vital capacities of patients before and after operation. They found that the vital capacity on the first day after operation was of the following order:—

Gall-bladder operations	25	Per cent. of the preoperative capacity.
Chronic appendicitis ..	60	
Inguinal hernia (Bassini)	50	
Non-abdominal	100	

These observations appear to be of the first importance and demonstrate the marked effect that an abdominal operation has on the ventilation of the lungs especially in the case of the upper abdominal group. In addition to this Christie and Beams's[12] experiments on the vital capacity of subjects lying down and sitting are illuminating. They found that in a series of 290 normal men and women there was a decrease of 5·5 per cent. in the prone as compared with the sitting posture. This, as would be expected, was accentuated in obese women.

There are therefore three main conditions necessary for the production of a post-operative pneumonia: (1) The presence of organisms in the lungs, either before the operation or aspirated during the period of unconsciousness at operation or soon afterwards. (2) The inhibition of the respiratory movements and in particular those of the diaphragm consequent on the surgical procedure. (3) The lowering of the patient's resistance.

Turning to the actual pathological process by which the pneumonia is produced apart from the route of infection, which has already been discussed, Elwyn [3] has suggested that the pneumonic consolidation is preceded by areas of collapse in which the infecting organisms find a "locus minoris resistantiæ." Churchill [2] has, however, pointed out the fact that pneumonia is an extremely rare complication of collapse of the lungs when produced artificially, such as with a pneumothorax for pulmonary tuberculosis or bronchiectasis, conditions in which there is a severe infection of the pulmonary tissue. From my own personal experience of this method of treatment I can substantiate this statement.

Mastics, Spittler, and McNamee,[13] and more recently Boland and Sheret,[14] have gone a step further and claim that a very large proportion of all post-operative lung complications are in reality varying degrees of collapse of the lungs. In answer to this conception I would point out the fact that it is a common occurrence to find lungs from patients dying shortly after operation with broncho-pneumonia in which there is no evidence of collapse, and although the occurrence of pneumonia together with areas of collapse is by no means a rarity, it would seem improbable that the collapse predisposes to the pneumonia.

A more likely explanation appears to be that the pneumonia is preceded by an infection of the bronchioles as has been demonstrated by Armstrong and Gaskell [8] in the case of a broncho-pneumonia of a pneumococcal origin, and should the exudation into the bronchi be of sufficient viscosity and allowed to remain owing to the inhibition of the cough reflex, a collapse will result. This conception agrees with that of Elliott and Dingley,[15] who showed that the blocking of the bronchi by inflammatory secretions was the most probable explanation of the phenomenon of massive collapse. That these secretions are capable of producing a collapse has been shown by Lee, Tucker, and Clerf,[16] who brought about the condition in dogs by introducing the bronchial secretion of a patient with the disease or a solution of gum acacia of a similar viscosity, the cough reflex having first been inhibited by drugs.

TREATMENT.

The treatment naturally divides itself into two phases: (1) prophylactic and (2) curative. The first may be divided into treatment before, during, and after operation. In my opinion greater attention should be paid to the examination of the chest for evidence of inflammation of the respiratory tract and a closer inquiry into the history of recent coughs and colds. At operation every effort should be made to protect the patient from exposure to circumstances which tend to lower his resistance, and during the first two or three days after operation the patient should be encouraged to move himself as much as circumstances will permit, and to practise taking deep inspirations. With the latter point in view, during the year 1928, patients in two wards, one male and one female, were instructed to blow water from one Woulfe's bottle into another connected to it by rubber tubing, the underlying idea being that the effort would induce deeper inspirations and thus reduce the area of inactive lung. The results were compared with those from two similar wards in which respiratory exercises were not given. They are as given in Table VI.

TABLE VI.

Type of operation.	Wards in which exercises were employed.			Wards in which no exercises were employed.		
	Cases.	Complications.	Per cent.	Cases.	Complications.	Per cent.
Upper abdomen	82	19	23·3	48	8	16·6
Lower abdomen	153	16	10·6	154	12	7·7

I have only included abdominal operations owing to the fact that the other types were in too small numbers. The results of this treatment are disappointing as any difference that is shown is in favour of the untreated class. The real reason for the failure is that the method takes no account of the human element. The average patient will not take inspirations, if such respirations are going to cause him considerable pain.

A further attempt to aerate the lungs was made by giving the patients a mixture of 50 per cent. CO_2 in air delivered through a nitrous oxide gas apparatus 24 hours after the operation. It was found that the patients would not tolerate the administration; it was too reminiscent of the operation they had just undergone. Scott and Cutler [17] published a preliminary report advocating the use of CO_2 as a prophylactic measure against massive collapse. The percentage of the gas was varied at the discretion of the administrator. It was given immediately after the operation, during the unconscious period, and would overcome my difficulty.

More recently Scott,[18] Coryllos,[19] and Yandell Henderson [20] have published papers emphasising the usefulness of CO_2 in the treatment of massive collapse and post-operative pneumonia. At this hospital the method is being given a trial, but so far no statistical evidence is obtainable.

The curative treatment of post-operative lung infections again resolves itself into an attempt to re-expand the lung bases, and similar methods to those outlined above may be tried. In addition, an expectorant mixture to assist in the coughing up of sputum is useful. Other treatment is purely symptomatic.

CONCLUSIONS.

(1) Post-operative chest complications may be divided into two groups: (*a*) Those due to an infection of the lungs and resulting in bronchitis, broncho-pneumonia, and their complications. (*b*) Those due to pulmonary embolism and resulting in either infarction of the lung or sudden death of the patient.

(2) Post-operative bronchitis and broncho-pneumonia are the result of an infection which reaches the lungs by way of the respiratory tract and which is either present before the operation or gains entrance thereto during or soon after the operation. General anæsthetics are in this way indirectly responsible for post-operative chest infections, because infected material may be aspirated during their administration.

(3) The other important factors are the lowering of the patient's resistance and the stagnation in the lower lobes of the lungs caused by the position of the patient and the immobility of the diaphragm and during the first two or three days after operation.

(4) Massive collapse of the lung is probably of a similar ætiology to post-operative pneumonia, but there is no reason to believe that it is an essential predisposing cause to the pneumonia.

I should like to thank the Surgical Staff of University College Hospital for allowing me to examine the cases that came under their care during the preparation of this paper.

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THE ACTION OF
ALCOHOL UPON THE BLOOD-SUGAR IN DIABETES MELLITUS.

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THERE is considerable difference of opinion about the value of alcohol in the treatment of diabetes mellitus, but that it has a use in this condition can hardly be doubted. Since alcohol can spare fat, approximately in the ratio of the calorie values of the two substances—i.e., 7 to 9—it must clearly be considered a valuable foodstuff, and since there is no evidence that it can itself form carbohydrate in the body, it appears at first sight to be a particularly suitable source of energy in diabetes. Few clinicians, however, are prepared to lay great stress upon the actual food value of alcohol, because, viewed in terms of calories alone, it can almost always be readily replaced by other substances. On the other hand, there are important considerations apart from its simple energy value. It has a place as a mental sedative in periods of partial or complete starvation, and as an aid to appetite, and it makes the often one-sided diets of the diabetic more palatable.

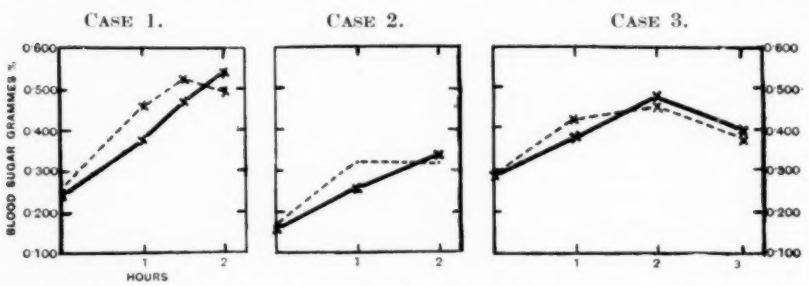
More important still is its action upon the hyperglycæmia, glycosuria, and ketonuria of diabetes, and a large amount of work has been done on the effect of alcohol upon the amounts of sugar and ketone bodies passed in the urine. On the whole, this work has shown some diminution, both in the glycosuria and in the ketonuria, but only when moderate amounts of alcohol have been given; excessive quantities have consistently produced the reverse effect. This has especially been noted when the excessive alcohol intake has been sufficient to raise the total calorie intake above a maximum optimum level.

Allen and Wishart in two cases saw increased sugar output when moderate amounts of alcohol were added to the diet, and Joslin and Allen in America have almost abandoned its use. On the other hand, almost all workers are agreed that alcohol possesses a definite antiketogenic value (Allen and Wishart, Higgins and collaborators, Neubauer), and most continental authorities advocate its use to lessen both glycosuria and acidosis. Thus van Noorden never observed an increase, but often a fall, in glycosuria, on the addition of alcohol to the diet in diabetes, and Kalz, in a study of 12 diabetics, found no disadvantage from the daily consumption of a bottle of strong, but as far as possible sugar-free, wine. Neubauer, Hirschfeld, Benedikt, and Torok are others (quoted by van Noorden) who have also shown a beneficial action upon the condition of the urine after the consumption of alcohol.

Results have been less consistent when the level of the blood-sugar has been examined, and this has undoubtedly been partly due to variations in dosage. Allen and Wishart observed a temporary lowering of the blood-sugar after giving alcohol to diabetics. This effect in some cases was considerable, but prolonged luxus rations of mixed fat and alcohol led to marked hyperglycæmia; Hetenyi found varying responses in the hyperglycæmia after giving 16 grammes of alcohol (approximately 1 oz. of brandy). Leclercq, by giving an excessive calorie value in the diet, together with alcohol in large doses, raised the blood-sugar in two very severe cases of diabetes to very high values—e.g., from 0·171 per cent. to 0·319 per cent. Fuller, however, in 12 cases noted a reduction in the hyperglycæmia when alcohol, in amounts from 5 to 30 c.cm. was either substituted for part of the fat in the diet or merely given as a simple addition to it.

Large amounts of alcohol seem to exercise some toxic action upon the liver, as is suggested by Albertoni's experiments on dogs, in which previous heavy administration of alcohol for some days made

the alimentary hyperglycæmia after 100 g. of glucose much more marked than in the normal animal after a similar dose of sugar. If this action is avoided, the effect, if any, appears to be rather to reduce than to raise the blood-sugar, a change which Gavrila and Sparchey found more marked in the diabetic than in the normal; giving 0·4 g. of absolute alcohol (well diluted) per kilogramme of body-weight, and using plain water as a control, they recorded a fall in blood-sugar, half an hour after the alcohol ingestion, as great as 75 per cent. of the fasting value in some of the six diabetics whom they examined. Such an insulin-like action, if confirmed, is clearly of considerable importance, and, if constant, must obviously be taken into account in the consideration of some of the experimental results obtained by the use of insulin substitutes given by the mouth in alcoholic solution. Thus Blatherwick and collaborators found that insulin given in dilute alcohol per os caused a 30 per cent. reduction of the blood-sugar, and many plant extracts advocated in diabetes as possessing insulin-like activity are, in fact, given in strong alcoholic solution. It is significant that the blood-sugar sinking substances extractable from almost all vegetable cells have mainly been prepared from alcoholic solution, as have many of the similar substances obtained from animal tissues.



Experimental Results.

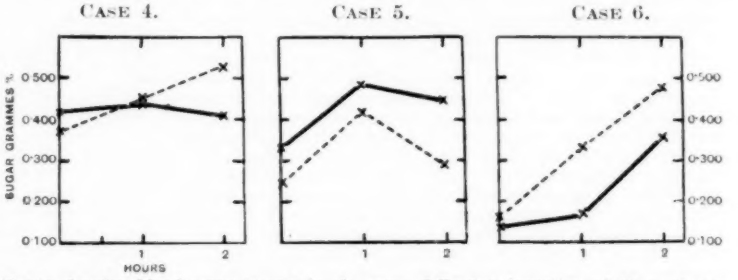
It seemed therefore worth while to study this question again in a number of diabetic patients, especially from the point of view of the action of alcohol, in a form most commonly ordered, upon the fasting blood-sugar. No detailed examination was made into the action upon glycosuria or ketonuria, since our knowledge on these points is full, and for the most part unanimous. The patients examined were all at rest in bed in the Medical Unit Wards of St. Mary's Hospital, and I am greatly indebted to Prof. F. S. Langmead, director of the unit, for permission to carry out these investigations. The procedure employed was as follows:—

The fasting blood-sugar was examined at 10 A.M.—no previous food or drink having been taken since 8 P.M. the night before—and again at 11 A.M., after which a dose of brandy, either a half or one ounce according to age, was immediately given in 4 ounces of water. The blood-sugar was then re-examined one hour and two hours later—i.e., at 12 noon and 1 P.M. Two estimations of the fasting level were made in order to detect any unsuspected tendency of the blood-sugar to fall, an inconstancy which, however, after a sufficiently long fast, is, in my experience, unusual.

Seyderhelm and Oestreich find that the blood-sugar in diabetes shows the highest value in the morning, and tends, in the majority of cases, to fall gradually during the day, but Nielson, studying the fasting level at frequent intervals, did not observe the variations or "pulsation waves" described by others. I have failed to observe changes, outside the limit of error of the method employed, on repeated examination during the same day. It may, I think, be accepted that there is no inherent tendency of the true fasting level to fall, at least in the course of a few hours. The estimations of the blood-sugar were carried out by Calvert's modified MacLean's method, the limit of error being in my hands not greater than 10 mg., except in cases showing exceptionally high values. In most cases duplicate estimations were performed, the mean value being taken when these two differed.

The results are recorded in Table I. It will be seen that in every case a fall took place, the lowest being of 32 mg., the highest of 122 mg.; this fall occurred mainly at the end of one hour, though in a few cases it was most marked at two hours. The average extent of the drop in the ten cases was 58 mg. The brandy used contained approximately 40 per cent. of alcohol by volume, so that the amount of alcohol given in one ounce was approximately 14 c.cm., with a caloric value of 98, or roughly the equivalent of 25 g. of carbohydrate.

In order to determine if possible whether this fall in blood-sugar was brought about by a direct action of the alcohol upon the gastric or duodenal mucous membrane or was the result of its action after absorption into the blood stream, a similar dose of brandy was given with similar precautions by the rectal route. In two control cases of diabetes a rectal wash-out, followed by the injection of 4 oz. of water, caused no appreciable change in the level of the fasting blood-sugar. The results in three patients given 1 oz. of brandy in 4 oz. of water are shown in Table II. It will be seen that the fall produced is very similar to that observed when the drug was given by mouth.



Charts showing blood-sugar curves, in six cases, following ingestion of 50 g. glucose (continuous lines) and 50 g. glucose plus 1 oz. brandy (interrupted lines).

TABLE I.—*The Effect of Brandy by Mouth upon the Blood-sugar in Diabetes Mellitus.*

No.	Sex. and age.	Fasting level. (1)	Fasting level. (2) (1 hour later.)	Dose of brandy in ounces.	Blood-sugar— First hour.	Blood-sugar— Second hour.	Fall (max.)
							mg.
1	F., 65	0·181	0·181	1	0·142	0·127	— 54
2	F., 64	0·340	0·340	1	0·330	0·252	— 88
3	F., 9	0·255	0·248	½	0·218	0·216	— 32
4	F., 51	0·155	0·153	1	0·104	0·097	— 56
5	M., 8	0·397	0·395	½	0·324	0·377	— 71
6	F., 46	0·130	0·127	1	0·097	0·088	— 39
7	M., 9	0·390	0·396	½	0·274	0·306	—122
8	F., 28	0·217	0·220	1	0·184	0·223	— 36
9	M.,54	0·140	0·140	1	0·089	0·100	— 51
10	F., 46	0·410	0·409	1	0·375	0·379	— 34

Blood-sugar in grammes per 100 c.cm. blood.
Average fall 58 mg.

It may thus be inferred—though three cases only were examined—that alcohol is not only absorbed from the rectum (as is well known) but that it exercises comparable effects upon the blood-sugar by this route to those following its ingestion by mouth.

Alcohol Plus Food.

Six patients were examined with the object of determining whether this hypoglycæmic action of brandy in diabetics could also be observed when it was given together with carbohydrate in the form of the customary sugar tolerance test; it was hoped in this way to obtain insight into its effect when given with food. For this purpose 50·0 g. of glucose and 1 oz. of brandy in 4 oz. of water were given, and blood-sugar estimations were made at intervals of one and two hours. The test was repeated after an interval of not less than two days, using the same dose of glucose but omitting the brandy. For many reasons such procedures are open to certain errors, and few definite conclusions can be drawn from the curves obtained. Thus it is important to allow an interval of time between the two tests, since administration of 50·0 g. of sugar to a diabetic may seriously affect his carbohydrate tolerance for at least 24 to 48 hours; moreover, intervening diet may undoubtedly influence the shape of the curve.

TABLE II.—*Alcohol Administered Per Rectum.*

No.	Sex.	Fasting.	Fasting 1 hour later.	Dose of brandy in ounces.	First hour.	Second hour.	Fall.
							mg.
1	M.	0·170	0·165	1	0·126	0·102	—63
2	F.	0·154	0·168	1	0·123	0·102	—59
3	M.	0·366	0·370	1	0·342	0·330	—33

TABLE III.—*Blood-sugar Curves in Diabetes, with and without the Addition of 1 oz. Brandy, following Administration of 50 g. Glucose.*

No.		Fasting.	1 hour.	1½ hours.	2 hours.	3 hours.
1	A	0·241	0·377	0·476	0·542	—
	B	0·251	0·460	0·526	0·492	—
2	A	0·151	0·255	—	0·332	—
	B	0·171	0·316	—	0·316	—
3	A	0·292	0·380	—	0·475	0·400
	B	0·285	0·420	—	0·451	0·380
4	A	0·418	0·437	—	0·410	—
	B	0·369	0·445	—	0·520	—
5	A	0·330	0·484	—	0·444	—
	B	0·241	0·418	—	0·287	—
6	A	0·136	0·166	—	0·356	—
	B	0·154	0·330	—	0·475	—

A = 50 grammes glucose, ℥iv. water. B = 50 grammes glucose, ℥iv. water, and ℥i. brandy. Blood-sugar in grammes per 100 c.cm. blood.

There is often an appreciable change in the sugar curve when it is examined on successive occasions, and it is known to vary rapidly with alterations in the carbohydrate content of the previous diet. In these cases the alcohol-sugar-test was first carried out, and after an interval of two to five days (in four cases three days, one case five days, and one case two days) the simple sugar test was performed. The curves of the six cases are here illustrated, and the blood-sugar values are shown in Table III. As will be seen no great variations are observed, and the only constant feature noticeable is that in all the patients a more rapid rise of blood-sugar occurred when the alcohol was given with the glucose than when the latter was given alone. Thus in all cases the increase in blood-sugar at the end of one hour was greater in the former than in the latter, the mean value of this excess rise (above that shown with the glucose alone) in the six cases being 65 mg. The maximal level reached was slightly higher with glucose alone than with glucose plus brandy in four cases; in one case the latter was considerably higher, and in one appreciably so. Although the curves obtained are by no means strictly comparable, yet the alcohol curve shows a sharper and more rapid rise, while the actual height reached is but little affected; in five of the six cases the rise during the second hour was greater with the glucose alone than with the glucose and brandy together.

It may thus be concluded that the effect produced by alcohol is that of causing a more rapid absorption of sugar into the blood, and a quicker rise in the level of the blood-sugar; time is affected more than actual level. Such a result is to be expected when it is remembered how alcohol is able to aid the absorption of substances from the stomach. Edkins, giving glucose through a stomach tube to cats anæsthetised with ether, found that the rate of disappearance of the glucose from the stomach was twice as great when it was given with alcohol as when given alone. It is thus clear how such increased rapidity of absorption may lead to the changes noted in the form of the blood-sugar curve in the cases here recorded.

Conclusions and Discussion.

A "medicinal" dose of brandy is capable of lowering the fasting blood-sugar in a diabetic, and this action is brought about after absorption of the drug into the blood stream. The exact mechanism is not easily explained. It is possible that it is brought about through an action of alcohol upon the liver, by which the function of this organ in "secreting" glycogen is improved, since alcohol may be more readily burnt and more storage of sugar can take place; in other words, a true carbohydrate-sparing effect may be produced. Some work upon the alteration of the respiratory quotient after the ingestion of alcohol supports the suggestion, and this action might well account for part of the obesity frequently seen after prolonged consumption of alcoholic liquors. It is doubtful, however, to what extent, if any, alcohol can replace carbohydrate in the body. Galami, by a simultaneous study of the blood-sugar and alcohol curves in the blood after ingestion of sucrose and alcohol, found that the two curves ran independently, and that alcohol was not used directly in muscular contraction—i.e., no replacement of carbohydrate by the alcohol took place. Another possible mode of action is that alcohol might directly excite the islet tissue, perhaps through a reflex increase of blood-supply resulting from vasodilatation of the vessels supplying these cells. Alcohol has a powerful stimulant effect on gastric secretion not solely due to its local action upon the mucous membrane. Steinitz and Schereschewsky found that 300 c.cm. of 5 per cent. alcohol given per rectum caused a rapid and copious secretion of gastric juice, the maximum flow occurring in 15 to 30 minutes; glucose, water, saline, and other solutions similarly administered had no such effect. There is, moreover, some evidence (Gley and Hazard) suggesting that the entrance of hydrochloric acid into the duodenum may provoke some secretion of insulin into the blood; it undoubtedly increases the output of external pancreatic secretion.

Thus alcohol, through its stimulant action upon gastric secretion and an increased production of "secretin" and of pancreatic secretion, might in this way provoke a moderate output of insulin itself. Zunz and La Barre, Novoa Santos, and others have shown a relationship between duodenal secretion and insulin production, and Onodera records marked lowering of the blood-sugar by the action of salts upon the duodenal mucosa. Whatever the precise explanation it is certain that alcohol has no specific individual action upon islet tissue, nor is the action in lowering blood-sugar in diabetes confined to alcohol alone, since many other substances possess a similar property. At the same time brandy is a readily available drug, and its associated actions may at times make it a particularly valuable one in therapeutics. In diabetic coma it would seem to be of value, either by mouth or per rectum; moderate amounts as an addition to, or substitute for, part of the diabetic diet appear to have no detrimental influence upon the hyperglycæmia. Given with sugar it increases the rate of absorption from the stomach, but does not necessarily cause a higher concentration of glucose in the blood than is produced when sugar is given alone. Its value in non-diabetic conditions, when

increase in nutrition is desired, has some support from this conclusion.

My thanks are due to Prof. Langmead, Director of the Medical Unit of St. Mary's Hospital, for his kindness in giving me facilities for carrying out these tests.

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SPINAL ANÆSTHESIA.

A CRITICISM OF THE PITKIN METHOD.

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AT the Manchester meeting of the British Medical Association last year, Dr. F. A. Kelly, of Detroit, U.S.A., speaking of the method of anæsthesia recommended by Dr. George Pitkin, of New Jersey, said that "Dr. Pitkin . . . has worked out a technique which to my mind does away with the objections to the older methods of spinal anæsthesia. The main objections in the past have been, first, the transitory nature of the anæsthesia; secondly, lack of control of the height or extent of the anæsthesia; thirdly, the serious depression of the blood pressure. The technique devised and advocated by Dr. Pitkin . . . completely negatives all of the above objections and with them other objections that one so often hears."[1]

Dr. Kelly, who demonstrated the Pitkin method in August, 1928, injected a fluid lighter than the cerebro-spinal fluid and containing 100 mg. of novocain per c.cm.; 1·1 mg. of strychnine and 14½ per cent. alcohol made up to 2 c.cm. with normal saline. The fluid also contained a body derived from starch and called "gliadin" or "amyloprolamin." He mixed this fluid with more or less cerebro-spinal fluid as required, and having injected it he tilted the table to direct the injection to the particular region he wished to influence. None of these procedures is new. It is possible that "gliadin" is new in this connexion, and though novocain and alcohol have both been used before as constituents of an intrathecal injection they may not have been used in combination. It is certainly a most valuable combination, and if Dr. Pitkin is responsible for this he has made a notable contribution to the practice of spinal anæsthesia. The function of gliadin seems to be to hold the injected solution together "as an air bubble on a spirit level" and to delay the absorption of the novocain so that toxicity is reduced and anæsthesia prolonged. By this means Dr. Pitkin is able to give much larger doses than have hitherto been given—up to 400 mg. or even more if necessary.

FIG. 1.

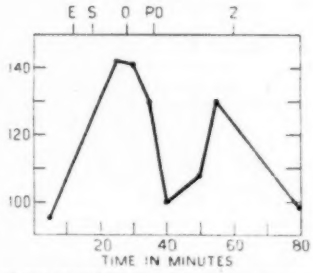

Chart showing blood pressure during operation. E = Ephedrine, 5 per cent.; novocain, 1 per cent. 1 c.cm. S = Spinocain, 2 c.cm. O = Operation begun. P.O. = Peritoneum opened. Z = Operation finished. The blood pressure before operation was 94 mm. and it remained above this level during the operation which was a complete abdominal exploration. After 45 mins. (i.e., 5 mins. after the operation was finished) the anæsthesia as tested by towel forceps was above the clavicles.

Dr. Pitkin states that "if the anæsthetic fluid is confined to the lumbar spine there is no change in the blood pressure; if it reaches the first thoracic the pressure becomes nil."[1] The record of blood pressure given in Fig. 1 shows that, at any rate in this dogmatic form, this statement cannot be accepted. The blood pressure usually falls below the normal in a complete laparotomy with the anæsthesia extending above the clavicle, but in this case it did not. Dr. Pitkin regards a large fall of blood pressure as one of the objections to the older methods of spinal anæsthesia. Figs. 2 and 3 show blood pressure records taken from patients anæsthetised by the Pitkin method; they were both desperate surgical risks and both made excellent recoveries, in part due to the protection afforded by the spinal anæsthesia. The technique, however, did not prevent a fall in blood pressure.

Are we to conclude that a fall of pressure does not matter or that some falls do matter and others do not? If, at the end of a long surgical operation with much visceral manipulation, shock or hæmorrhage, the blood pressure falls steadily, progressively and extensively, then indeed the fall is the index and measure of the gravity of the situation. If, on the other hand, a fall is produced by injecting half a dozen grains or so of novocain into the spinal theca and paralysing a vaso-constrictor or two, the fall should be regarded as an indication of the amount of vaso-dilatation, and the need for some degree of the Trendelenburg position, but not as a sign that the situation has developed into one of unexpected gravity. The fear of a fall of blood pressure is a relic of a different technique in which the anæsthetic solution was heavier than the cerebro-spinal fluid and was not fixed. The patient had to sit up, the Trendelenburg position was not available, and a dangerous anæmia of the medullary centres might appear.

The Pitkin method is valuable, therefore, not because it completely negatives a large fall of blood pressure, but because in the circumstances of a modern operation a large fall of blood pressure is not greatly to be feared. The passing danger of anæmia of the medulla is overcome by the Trendelenburg position and the heart, accustomed to work against a pressure of 200 mm. of mercury, finds itself relieved of three-quarters of its burden, presumably to its advantage.

In these cases of high blood pressure the pressure is doubtless a response to some subtle need of the organism, but the subsequent histories of my cases do not suggest that the need is so imperious that it can suffer no remission, while the surgeon removes its cause, or a large factor of its cause. When the anæsthesia reaches as high as or higher than the second dorsal, why is it that we find sometimes a big fall in blood pressure, at other times little or none? It may be possible to anæsthetise the posterior roots

[1] Brit. Med. Jour., 1929, ii., 187; see also THE LANCET, 1929, ii., 825.

and not the anterior, and as the vaso-constrictor fibres pass out by the anterior roots through the white rami communicantes to join the splanchnics, they may possibly escape the action of the novocain. The last word has not been said on this question and the time for dogmatic statement is not yet.

Strychnine.

Dr. Pitkin says: "We conducted a series of tests and animal experiments with all the drugs that have been advocated as vaso-constrictors. Strychnine, intradurally, was the only one that showed satisfactory results in the presence of novocain."[1] So far as I know, he has published no experiments in support of this statement. With reference to the effects of therapeutic doses of strychnine on the blood pressure to be contra-indicated. Clinically, it is interesting to note that Jonnesco,[2] who has had a longer experience of spinal anæsthesia than anyone in Europe, has given up intrathecal strychnine after 15 years' trial. Both adrenalin and ephedrine will raise the blood pressure, even after destruction of the splanchnic nerves, so that there seems no object in using a drug like strychnine for this purpose. The reasons against it are overwhelming; they are: (1) there is little reason for supposing that we require to raise the blood pressure; (2) there is no convincing evidence that strychnine will raise it; (3) other drugs will; and (4) strychnine produces a state exactly opposite to the one desired.

Messrs. May and Baker have kindly made for me a solution resembling spinocain but containing no

FIG. 2.

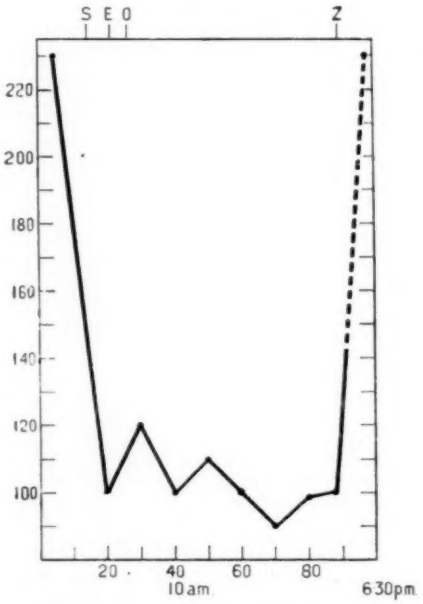

Chart of blood pressure during operation on a woman, aged 63, with a fistula between gall-bladder and duodenum. The gall-bladder was excised and the duodenum stitched up, the operation lasting 50 minutes. S = 2 c.cm. spinocain. E = 1 c.cm. ephedrine, 5 per cent.; novocain, 1 per cent. O = Operation begun. Z = Operation finished. During operation the blood pressure fell from 230 to 90 mm. Hg. A few hours later it had fully recovered.

FIG. 3.

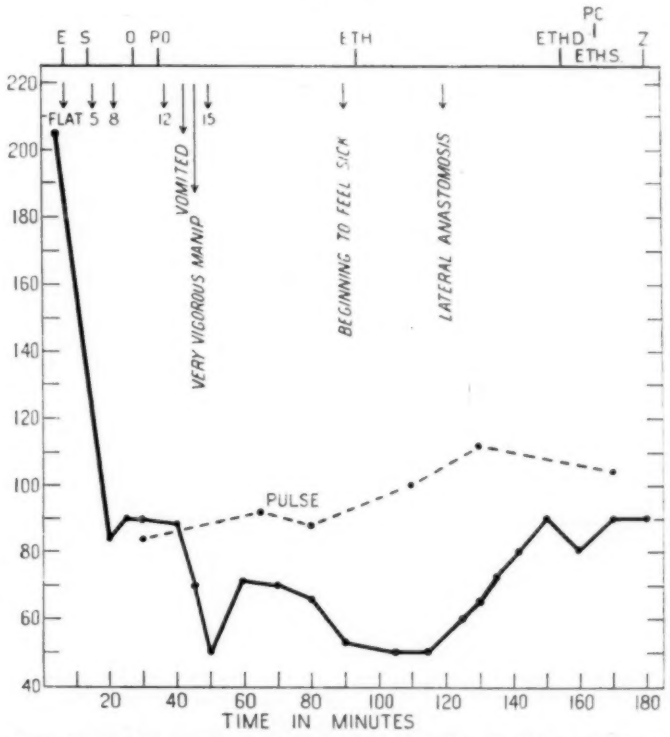

Chart showing blood pressure of a male, aged 65, during resection of growth of colon. E = Ephedrine, 5 per cent.; novocain, 1 per cent. 1 c.cm. S = Spinocain, 2 c.cm. O = Operation begun. P.O. = Peritoneum opened. ETH. = Ether. ETH.D. = Ether deepened for stitching peritoneum. P.C. = Peritoneum closed. ETH.S. = Ether stopped. Z = Operation finished. Flat 5, 8, 12, and 15 = degree of slant of table, head down. The chart shows a fall of blood pressure from 205 mm. Hg to 50 mm. Hg. It also shows a slow steady rise, presumably due to the gradual absorption of the spinocain. The pulse-rate was 104 at end of operation lasting 2 hours 32 mins. Patient made a good recovery.

Sollmann says: "These effects are so inconstant and small that they could be accidental."[3] When strychnine has been applied to the cord direct there is no mention of a rise of blood pressure. The case for the rise of blood pressure is not proven. The great characteristic action of strychnine is to break down the internal resistance of the spinal cord so that a definite stimulus produces a bigger motor response than in normal conditions. This leads to the early onset of rigidity and puts the patient into a state diametrically opposite to the one desired by the anæsthetist, who wants a smaller response to a given stimulus. He wants the passage from one side of the reflex arc to the other made more difficult, and the internal resistance of the spinal cord increased. On theoretical grounds, then, strychnine would seem strychnine, and it has given clinical results in no way inferior to those of spinocain. Whereas the two biggest falls of blood pressure (Figs. 2 and 3) I have seen occurred in patients who were anæsthetised with spinocain, the longest anæsthesia I have seen, in which there was complete muscular relaxation and absence of pain for one and three-quarter hours, was done under this strychnine-free preparation.

Controllability.

Under this heading come the three factors of height, duration, and intensity. Almost anything may result from extracting 2 c.cm. of cerebro-spinal fluid from the theca between the third and fourth lumbar vertebræ and reinjecting it mixed with 2 c.cm. of spinocain; there may be anæsthesia extending

[1] Sollmann, T.: Manual of Pharmacology, 3rd ed., Phil., p. 254.

[2] Jonnesco, T.: Presse. Méd., 1926, xxxiv., 145.

downwards from an inch below the nipple line, or only from an inch below the umbilicus, the patient being in the Trendelenburg position 5°. If expansion is essential for a high anæsthesia, how is it that a high and long anæsthesia is produced when only 2 c.cm. of cerebro-spinal fluid have been extracted? It is not very rare to be able to do a laparotomy under these conditions.

Duration again is a variable quantity. One hour is generally available for laparotomies after the administration of 2 c.cm. of spinocain. The longest time I have ever seen was one and three-quarter hours, but this was after the injection of 3 c.cm. of the strychnine-free preparation made for me by Messrs May and Baker; pain and rigidity were completely in abeyance for the whole of this time. When the anæsthesia passes off it does so by the oncoming of pain or rigidity. As the case whose blood pressure record is shown in Fig. 5 illustrates a number of these points, I shall describe it in detail.

The patient was a strong, muscular young man of 28. He had had more than one hæmorrhage from the bowel, and a provisional diagnosis of duodenal ulcer had been made. In view of a probable gastro-enterostomy, a high anæsthesia was required, and 3 c.cm. of spinocain were mixed with 5 c.cm. of cerebro-spinal fluid and injected into the theca between the first and second lumbar vertebræ. The anæsthesia and the muscular relaxation were good. On opening the abdomen a diseased Meckel's diverticulum was found; this was removed, as was also the appendix. The surgeon then turned to me and said "You must give him some ether." I said "What for? He's not feeling anything." This was confirmed by the patient. However, the abdominal walls were too rigid to proceed without ether. This conversation took place one hour and two minutes after the injection of spinocain. The assistant surgeon, who had come 40 minutes late, said that he had noticed that the muscles had been getting more and more rigid ever since his arrival—that is to say, 20 minutes before the surgeon asked for ether, up to which time the patient had felt no pain. The path of pain to the brain was blocked, but the spinal reflex was not. No root anæsthesia could account for this. The spinal cord was blocked high up, but free lower down.

This means that the novocain is high in the dorsal region, where it is not only anæsthetising the roots of the nerves but the cord as well, and so preventing pain. The spinothalamic tract, the path of pain, is blocked. The original muscular relaxation (abdominal) must have been due to a portion of the spinocain left behind by the main mass during its ascent to the higher dorsal region, but these trailing clouds have been absorbed leaving the lower cord free and—thanks to the strychnine—in a highly excited condition, thus accounting for the rigidity.

The evidence from this case, then, tends to show: (1) That the anæsthetic affects the cord (spinothalamic tract), as well as the posterior roots. (2) That the spinocain does not remain en masse. (3) That strychnine is contra-indicated. (4) That the commonly accepted idea that the anæsthesia passes off from above downwards is that particularly dangerous form of fallacy, a half-truth; it does pass off from above downwards, but equally from below upwards. (5) That in those cases in which it is only possible to extract 1 or 2 c.cm. of cerebro-spinal fluid, the anæsthesia required for a laparotomy can be attained if the resulting 3 or 4 c.cm. of mixture can be placed in contact with the cord in the region of the sixth, seventh, eighth, ninth, and tenth posterior dorsal roots. I have records of such cases.

C. A. Pannett [4] has shown that the dural sac is inextensible, and tends to assume the form of a cylinder. A semi-mucilaginous fluid injection which remains en masse should assume the form of a cylinder too, its length depending upon its bulk. Assuming that this anæsthetic solution is absorbed at the same rate all along the line—a reasonable assumption—the anæsthesia should pass off all along the line, at the moment when the concentration of novocain in the solution becomes a sub-anæsthetic concentration. It is doubtful if this ever happens in practice, but there is definite evidence that anæsthesia no longer exists at an area where, a few minutes before, it had existed, coupled with the existence of anæsthesia, both then and now, in a neighbouring segment. A case will illustrate my meaning.

A fistula in ano came to operation on July 12th last. Two cubic centimetres of spinocain were mixed with one cubic centimetre of cerebro-spinal fluid and injected, the patient being in a 5° Trendelenburg position. The operation lasted 25 minutes and was painless. The last step of the operation was the insertion of two stitches, which was painful. The patient winced at each prick of the needle, and remarked that the numbness was passing off. I pinched the skin over both calves immediately after, and again 5, 10, and 15 minutes later, and he could feel nothing, and said: "It's no use, I can't feel anything below the knees." Here, then, the fifth sacral and coccygeal nerves had been anæsthetised, but the anæsthesia had passed off while the fifth lumbar and first and second sacral segments were still anæsthetised. The anæsthetic area had contracted, but had not been extinguished all along the line at the same time.

FIG. 4.

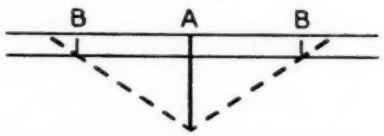

Diagram to illustrate the absorption of spinocain from the theca. The areas supplied by region (A) of the cord and its roots will be under the influence of spinocain longer than the areas supplied by regions at (B).

The shape of the injected solution, supposing the bulk of it to remain en masse, must be roughly triangular or semi-hemispherical (Fig. 4). The deepest part of the solution will be at the point of injection (or where the solution settles itself), becoming less deep on either side; the depth of anæsthesia will correspond to the depth of the solution.

Criticism of Dr. Kelly's Statement.

With a high dorsal anæsthesia the change in blood pressure may vary from a fall of 154 mm. of mercury to an actual rise above the preoperative reading; with the same dose, the same mixture, and the same slant of the table there may be a variation of four spinal segments—sixth to tenth dorsal—in space, and nearly 100 per cent. (35–85 minutes) in time. This is controllability, perhaps, but limited controllability.

Dr. Kelly mentions the presence of active peristalsis during spinal anæsthesia, but, as Dr. A. L. Flemming pointed out at the meeting, this is also observed when the patient is under a general anæsthetic. In the light of recent work by M'Crea and Macdonald [5] of Manchester University, the old theory of the vagus being the excitor and the splanchnic the inhibitory nerve of the stomach is no longer entirely tenable. It is probable, then, that Dr. Kelly's explanation—that the increased peristalsis is due to paralysis of the "vasomotor nerves (the source of intestinal inhibition)"—is more in accordance with an old theory than with new truth.

If, then, the Pitkin method gives little control over the duration of the anæsthesia, less over its height, and practically none over the blood pressure, and if Dr. Kelly's explanation of the increased peristalsis is at variance with the results of modern research into the function of the splanchnics, in what does the excellence of the method consist? Insufficient experience of other methods and of the limits to which the Pitkin method can be pushed make me diffident of too great a dogmatism. However, I would suggest that safety is its primary virtue. In novocain we have a drug that is almost if not quite ideal. Stovaine is admittedly more toxic than novocain, but it causes greater muscular relaxation. The muscular relaxation given by novocain is obviously not that of curare. In a high abdominal operation it is usual to cause some discomfort on manipulation of the stomach, and this is commonly attributed to dragging on the peritoneum on the under surface of the

[4] Pannett, C. A.: THE LANCET, 1929, i., 271.

[5] M'Crea, E. D., and Macdonald, A. D.: Quart. Jour. Exper. Physiol., 1928, xix., 161.

diaphragm or to vagal stimulation. This is thought to be unavoidable because if the anæsthetic went high enough to anæsthetise the third and fourth cervical segments it would paralyse the diaphragm. I doubt this. First, Pavlov has shown that the "motor area" in the brain is primarily a receptor rather than an executor area, and there may be an analogous mechanism in the cord. Secondly, in a very high anæsthesia, up to and even beyond the first dorsal, there is no clinical evidence of interference with the intercostal muscles. Presumably the relaxation of the abdominal muscles under novocain is due to a paralysis of the receptor mechanism, and, even if this paralysis extended to the third and fourth cervical, the diaphragm would still receive innervation from the unparalysed respiratory centre and exercise its still unparalysed motor mechanism. In other words, novocain is a drug that paralyses receptors only. This would be as fatal to the diaphragm as to the abdominal muscles were it not for the alternative stimulus for the diaphragm from the respiratory centre. It is somewhat like an engine with dual ignition; when the battery fails it will run on the magneto.

The next point in favour of the Pitkin method is the use of a colloid which tends to hold the solution together and delays absorption of the drug. This reduces toxicity and, allowing the use of larger doses, prolongs the duration of the anæsthesia. There is no evidence to show that "gliadin," whatever it may be, is any better than dextrin. Dr. Pitkin is too much of a purist to admit that there is any virtue in chloroform, but I have found that a mixture of the two methods can be made to combine the advantages of each without the drawbacks of either (Fig. 5).

The measure of success achieved with spinal anæsthesia depends on the trained intelligent coöperation of those surrounding the patient. A nurse who tells her patient that nothing would induce her to have a spinal anæsthetic goes some way towards inducing a wrong state of mind which makes all subsequent procedures more difficult. Conversation, however necessary it may be, if conducted in whispers is apt to give rise to the impression that some sort of conspiracy is afoot. The surgeon and the doctor in attendance should trust the anæsthetist, whose job it is to keep in intimate touch with the patient in order to be aware of the exact state of his feelings. It is the surgeon's part to get on with the operation and glean such information as he may require from the anæsthetist and not from the patient. In testing for the height of anæsthesia a surgeon should not clip the skin with towel forceps and say "Does that hurt you?" It is rude to the anæsthetist and disturbing to the patient; it is apt to shake his confidence, and he will argue that these people do not know whether they are hurting him or not so he had better let them know in time. Another thing patients resent—two of them have used the word "insulting" when referring to it—is the placing of instruments on their undefended chests. No one but an anæsthetist, whose hand frequently wards off some of this steady rain of blows, knows how exactly the adjective describes the offence.

FIG. 5.

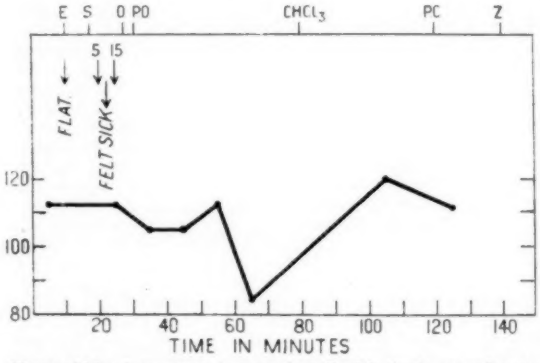

Chart of blood pressure in case described in text. E. = 2 c.cm. ephedrine, 5 per cent.; novocain, 1 per cent. S = 3 c.cm. spinocain. O = Operation begun. P.O. = Peritoneum opened. P.C. = Peritoneum closed. Z. = Operation finished. Flat 5 and 15 = degree of slant of table with head down.

Whatever success we may have achieved with spinal anæsthesia has been due to the coöperation of all concerned. The development of a new technique calls for the exhibition of many desirable qualities and they have been forthcoming. The enthusiasm of Mr. A. H. Burgess, the interest of Mr. W. H. Hey, and their patience, coupled with the loyalty of their nursing staffs, have been indispensable and inestimable.

THE IRRADIATION OF MILK

FOR THE INCREASING OF ITS ANTIRACHITIC POTENCY.

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With a Description of a Method of Irradiation Devised by J. O. HICKMAN.

IT has been known for some years that the antirachitic potency of milk could be greatly increased by irradiation from a quartz mercury-vapour lamp (Steenbock and Daniells,[1] 1925), but it soon became evident that such treatment, while beneficial from the standpoint of the vitamin D content, could be extremely harmful from the standpoint of the vitamin A content (Titus,[2] &c., 1926, and Drummond,[3] 1927). The treatment which resulted in the destruction of vitamin A appears, however, to have been unnecessarily prolonged, for later work by Supplee and Dow[4] (1927) claims that an exposure of milk in thin films to a Hanovia lamp for a few seconds or not more than one minute about doubles the antirachitic value of the milk, and apparently does not destroy the vitamin A.

Earlier investigations showed that a prolonged exposure imparted to the milk a disagreeable odour and taste, and one of us (J. O. H.) has found that any time longer than eight minutes turns the milk putrid; a series of tests has shown that a slight change in flavour could not infrequently be detected after an exposure of 30 seconds, which became more marked with every lengthening of the exposure till the change to putridity after eight minutes.

The present paper gives the results of short-time exposure of milk (both whole and skimmed) to ultraviolet light under conditions which have definitely increased the antirachitic potency without apparently decreasing the vitamin A content of the milk or appreciably affecting its taste. The irradiation of the milk was carried out daily by a method devised by one of us (J. O. H.). The milk was run over a 21 in. by 22 in. milk cooler at the rate of a gallon in 15 minutes. It was allowed to run for a few minutes before the lamp was brought to work on it, during which time the film was spread evenly over the whole surface with a spoon. Once spread the film should not break. The lamp used was of the Hanovia type. It was run at 200 volts, 2 ampères, and allowed to burn for several minutes before it was allowed to play on the milk. It was hung at a distance of 12 in. from the middle of the film of milk, and a specially designed reflector to focus the rays upon the surface to be treated was employed. It may be estimated that a particle of milk would be, on an average, 30 seconds on the cooler, but for a great part

of this time it would be on the horizontal parts of the cooler, and thus scarcely affected by the rays from the lamp. No special efforts were made to produce a current of air between the lamp and the film of milk. For the purpose of the fourth experiment the rate of flow of the milk was accelerated so that the time of exposure was reduced to about 15 seconds and two gallons passed over the cooler in 15 minutes. The sample of untreated milk was taken from the bucket of milk which was afterwards treated, so that the two samples "treated" and "untreated" were identical except for the irradiation.

It was felt to be of the highest importance that no treatment of milk should be recommended if there were the slightest danger of any reduction in its vitamin A activity. Accordingly a rigorous test of the vitamin A content of the milk before and after the irradiation was carried out by the method described by Steenbock and Coward[5] (1927).

Experimental Work.

Controlled tests of the vitamin content of the irradiated milk have been made for us on rats, with the following results:—

Vitamin A.—Varying quantities, 0·5, 1 and 2 c.cm., of the untreated and of the irradiated milk was given each to three or four rats. The growth response of the rats was graded to the dose in each case, and there was no appreciable difference between the growth response of the rats given untreated or irradiated milk; therefore it appeared that the vitamin A content of the milk was unaffected.

Vitamin D.—As to the vitamin D content of the milk irradiated, five tests were carried out between August, 1928, and June, 1929; in each the rats were given the high-calcium, low-phosphorus diet of Steenbock and Black[6] (1925) for a preparatory period of three weeks; thereafter some rats in each litter were given a preparation of irradiated ergosterol, some untreated milk and some irradiated milk, in each case for a period of ten days; the degree of healing engendered in the rachitic rats was estimated by the "line" test.

Expt. 1 (*August, 1928*).—To compare the effects of untreated milk, irradiated milk, and irradiated ergosterol. The irradiated milk was found to contain 0·13 to 0·2 unit of antirachitic activity per c.cm., or more than five times that of the untreated milk.

Expt. 2 (*November, 1928*).—To compare the effects of untreated milk, milk irradiated once and twice, and irradiated ergosterol. The once irradiated milk contained 0·5 unit of antirachitic activity, and the twice irradiated about double this or one unit: the antirachitic activity in the untreated milk was negligible.

Expt. 3 (*February, 1929*).—To determine whether skimmed milk could be given antirachitic properties by irradiation. The severity of the rickets in the rats used for this test was distinctly less than in the previous tests, but it showed that the untreated skimmed milk had no antirachitic activity, but the irradiation of this milk produced appreciable antirachitic activity in it. In all the above experiments the time of exposure of the milk was 30 seconds.

Expt. 4 (*February, 1929*).—To compare the capacity for activation of whole and skimmed milk, and to try the effect of the shorter exposure of 15 seconds only. The result showed that the vitamin D content of the untreated milk was nearly negligible, but the irradiated skimmed milk contained 0·8 unit of antirachitic activity per c.cm., and the irradiated whole milk 2 units per c.cm.

Expt. 5 (*June, 1929*).—To estimate the antirachitic potency of the milk of cows on the best summer feed and to try the effect of an irradiation for eight seconds only. The untreated milk contained 0·1 unit of antirachitic activity per c.cm., which the irradiation for eight seconds increased to 1 unit, an increase of no less than 900 per cent.

Results on Children.

Three examples of the use of this irradiated milk over a period of time can be given (J. O. H.).

(*a*) Boy born Oct. 2nd, 1922:

	1/1/27	1/1/28	1/1/29	2/11/29	2/12/29
Height	3ft. 8¾in.	3ft. 10in.	4ft. 2½in.	4ft. 4¼in.	—
Weight	41lb. 9oz.	44lb. 14oz.	50lb. 2oz.	57lb.	58lb. 4oz.

(*b*) Girl born Jan. 18th, 1924:

	1/1/27	1/1/28	1/1/29	2/11/29	2/12/29
Height	3ft. 2¾in.	3ft. 4¼in.	3ft. 8¼in.	3ft. 10¾in.	—
Weight	32lb. 8oz.	33lb. 1oz.	37lb. 2oz.	41lb. 13oz.	42 lb.

These children had untreated milk in 1927, and from January, 1928, to date the same quality milk irradiated: the average quantity taken by the boy was 2 pints per diem, by the girl 1½ pints per diem.

(*c*) Boy born July 3rd, 1927:

	Weight	
Aug. 2nd, 1928	20lb. 4oz.	on ordinary Grade A milk.
Sept. 2nd, ,,	20lb. 9oz.	on ordinary Grade A milk.
Oct. 2nd, ,,	21lb. 7oz.	half the month irradiated milk.
Nov. 2nd, ,,	21lb. 13oz.	on ordinary milk.
Dec. 2nd, ,,	24lb.	on irradiated milk.

Thereafter he continued on the irradiated milk to gain on the average 1 lb. 4 oz. per month for three months.

Discussion.

The increase in the weight of these children when given irradiated milk, compared with that when they were given the same milk but untreated is striking. Observations have also been made (D. N.) at the Hospital for Sick Children, Great Ormond-street, on children with severe rickets, marasmus, malnutrition, and other serious ailments, with very good results, although it is not possible to give to these observations the scientific accuracy described for the animal experiments detailed above. It was frequently found that a week or two on the irradiated milk acted as a fillip to the child, who then started to improve, after having been stationary for some time. The writer has drunk a glass of the milk daily for more than a year, and during the past winter, when on several occasions a tickling in the throat seemed to be the premonitory sign of a threatening cold, this did not materialise. Several adults who have partaken of the milk daily for many months feel themselves the better for it.

There is a further point of interest in connexion with the irradiation of milk—viz., the effect on the bacterial content. Many examinations of the bacterial content before and after irradiation have been made and invariably there has been a considerable reduction in the numbers of bacteria present after the irradiation, frequently to only one-tenth of the original numbers. It should be added, however, that this milk is amongst the most bacteria-free examined (D. N.), for rarely have there been more than a few hundred organisms per c.cm. of the untreated milk, and on no occasion have more than 4000 organisms per c.cm. been counted. This purity of the milk as regards bacteria may possibly be due in part to the practice of applying the ultra-violet rays to the udder and teats of the cow just before milking, and to the fact that all the dairy utensils are similarly treated just before use.

In a recent paper on the therapeutic value of irradiated milk in the treatment of rickets, Chalmers Watson, Finlay, and King[7] confirm earlier observations as to the value of irradiated milk in the prevention and cure of rickets, and they show that the disease is cured more quickly and economically by the use of irradiated milk than by the various irradiated preparations on the market. Their paper confirms our own observations that irradiated milk may prove of considerable value in the treatment of other disorders besides rickets. They strike a note of caution, however, which should be borne in mind when irradiated milk is being given to children—namely, that in view of its powerful effect on the growing bones, the possibility of their premature ossification must not be overlooked, and they advise that irradiated milk should not form the sole diet of infants and children, but that these should be given one part of irradiated milk to one or two parts of good, fresh milk.

More recently still Katharine Coward,[8] in an article on the value of irradiated milk compared with cod-liver oil as a source of vitamin D, draws attention to the fact that vitamin D content of irradiated milk may vary within wide limits (0·1 unit to 2 units per

gramme), though with the method of irradiation we have described the usual content of the milk has been about 1 to 2 units per gramme. Dr. Coward also points out that cod-liver oil itself may vary from 50 to nearly 200 units per gramme as regards its vitamin D content.

Summary.

1. Untreated milk, both whole and skimmed, has very little antirachitic activity. The best sample examined had only 0·1 unit per c.cm., and this was taken during a time when the cows were receiving the best "summer feed." Three samples taken during the winter and one taken during drought conditions at the same farm showed such slight antirachitic potency that it might be termed negligible.

2. The antirachitic potency of the milk can be increased enormously by direct irradiation from a quartz mercury-vapour lamp. Where the potency of the untreated milk could be measured, that of the treated milk was increased nine times by an exposure of eight seconds.

3. The capacity for activation of different samples of milk varies.

4. An exposure of 30 seconds (the longest period tried in these experiments) had no detectable influence on the vitamin A potency of the milk.

5. The irradiated milk can cure as well as prevent rickets in children and animals, and is of value in other disorders of nutrition, and in other diseases.

6. Irradiation produces a marked decrease in the bacterial content of the milk.

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TREATMENT OF STREPTOCOCCAL SEPTICÆMIA WITH STREPTOCOCCAL ANTITOXIN.

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Mr. Burt-White's recent paper [1] on the treatment of cases of puerperal septicæmia by scarlet fever antitoxic serum has prompted me to publish, rather prematurely, a very small number of cases of streptococcal septicæmia which have been successfully treated in this manner.

I intend to publish only the four cases in which the infection was proved by isolation of *Streptococcus hæmolyticus* from the blood, but as they were all extremely severe, and as they all made complete recovery, I think it worth placing them on record with the hope that this form of treatment may receive a more extensive trial. These cases were in no way selected and happen to be the only ones that I have had access to since the publication of the experimental work of Parish and Okell [2] in 1928. This important piece of work made it probable that antitoxin prepared from scarlet fever streptococcal toxin would be effective against hæmolytic streptococci from other sources, and they urged that "as this is the only streptococcal antibody with any acceptable and experimental credentials it should be given an extensive trial in all severe streptococcal infections, particularly in general septicæmia."

Historical.

The published results of the antitoxin treatment must necessarily be scanty at this early stage and, apart from the paper referred to above, I am only aware of the following:—

Sanderson [3] and others in 1927 successfully treated a case of puerperal septicæmia and a case of septicæmia secondary to otitis media by injecting concentrated scarlatinal streptococcal antitoxin intramuscularly. These cases were first tried with the ordinary polyvalent antistreptococcal serum, but as they did not respond to this and other remedies the scarlet fever streptococcal antitoxin was administered.

The second case was thought to be beyond hope of recovery when the antitoxin treatment was commenced. Boente [4] in the same year, 1927, reported that the serum from convalescent cases of scarlet fever had a curative action in cases of erysipelas and other streptococcal infections, but no effect in cases of infection with *B. coli* or *Staphylococcus aureus*. He also showed that antiscarlatinal serum from an immunised horse was beneficial in cases of puerperal infection, acute tonsillitis, and erysipelas, and furthermore, that sera prepared against strains of streptococci isolated from cases of puerperal fever or erysipelas were beneficial in scarlet fever.

Cases.

The following is a brief description of the cases under my observation.

CASE 1. *Septicæmia following a Pricked Finger.*—On May 14th, 1929, a doctor, aged 69, pricked his thumb with an adenotome after operating on a case of tonsils and adenoids. Two days later the thumb became very painful and slightly oedematous, and an unsuccessful attempt was made to evacuate the pus under a local anæsthetic. The infection appeared to spread up the arm, and on May 21st temperature rose above normal. On the 22nd the temperature was 103° F., a general anæsthetic was administered, and Mr. E. K. Martin performed an extensive operation evacuating the pus. A blood culture taken at the time of operation gave a pure and massive growth of *Streptococcus hæmolyticus*. 15 c.cm. of scarlet fever streptococcus antitoxin (Parke, Davis and Co.) were injected intramuscularly. On the 23rd the temperature reached 103° F., and another 15 c.cm. of the same antitoxin were administered subcutaneously. On the 24th the temperature only reached 100° F., and 10 c.cm. of concentrated scarlatina streptococcus antitoxin (Burroughs, Wellcome and Co.) were administered subcutaneously. On the 25th the temperature only reached 99° F., and a blood culture taken on this date was sterile. A further 10 c.cm. of antitoxin (B. W. and Co.) were injected subcutaneously. On the 26th the temperature did not rise above 99° F. Thus for two days the temperature was practically normal, but the next day and during the following ten days it rose and fluctuated daily on the 101° F. mark. This was due to the pus pocketing, and when the pockets were opened the temperature became normal and the patient recovered. The patient's general condition was so good during the second febrile period that no further serum was given.

CASE 2. *Puerperal Septicæmia.*—A woman, aged 37, was confined on April 2nd, 1929, the child being born before arrival of the doctor. No manipulation was employed. She was quite well until the third day when the temperature rose to 101° F. and pulse-rate to 116. From this until the eighth day the temperature varied between 104·2° and 100·8° F., with a pulse-rate of 150–120. General peritonitis was suspected and a laparotomy was performed, but apart from a little serous effusion nothing was found. A blood culture was performed and *Streptococcus hæmolyticus* was isolated. When seen by Mr. C. D. Read she was in extremis, with heliotrope flush and slight toxic strabismus. 10 c.cm. of scarlatina streptococcus antitoxin (B. W. and Co.) were given intravenously at once and 10 c.cm. intramuscularly on the thirteenth and fourteenth days respectively. On the fifteenth day the temperature was 99·2° F. and pulse-rate 112, and the patient was definitely better. The serum was repeated two days later and the temperature gradually settled down and the patient made a complete recovery.

CASE 3. *Puerperal Septicæmia.*—A woman, aged 29, was confined on Sept. 1st, 1929. The confinement was normal apart from a small perineal laceration. After the confinement the temperature was about 99° F. until the fourth day when it reached 100° F. On the seventh day the temperature was 102·2° F., with a pulse-rate of 96, and a foul, blood-stained vaginal discharge; the uterus was not involuted. On Sept. 8th the uterus was evacuated and a cotyledon of placenta was removed. As a result of this the temperature showed slight improvement but soon rose to the 103° F. and 104° F. mark, and signs of general septicæmia appeared. *Streptococcus hæmolyticus* was isolated

from the blood on Sept. 25th, and the patient was very ill indeed. Scarlatina streptococcus antitoxin (B. W. and Co.) was given intramuscularly almost daily for the next 14 days. Eleven doses of 10 c.cm. each were given, and they showed a slight but definite lowering effect on the temperature. The serum was then discontinued, and the temperature started on the upward grade again and fluctuated between normal and 103° F. for the next three weeks. An abscess formed in the right deltoid muscle and the pus was evacuated on Nov. 4th. The temperature became normal two days after this, and then started to rise again and another abscess formed in the right buttock. This was opened and drained, and the temperature rapidly came down to normal, where it remained and the patient recovered.

CASE 4. *Septicæmia with Double Otitis Media and Empyema.*—A child, aged 4 years, was admited to hospital on Oct. 3rd, 1928, with a history of having been restless and feverish, with slight cough, for the past seven days, and of having had some pain in the right ear for the last two days. On admission the temperature was 103·6° F., the respirations 40, and the pulse-rate 112. The child appeared extremely ill. At this time there were no physical signs save slight dullness at the right base, and some redness of the right membrana tympani which was incised on the same day. On Oct. 4th there was a rigor lasting 10 minutes, and serous discharge from right ear. On the 7th definite signs of patches of consolidation were noted in both lungs. The child was desperately ill and *Streptococcus hæmolyticus* was isolated from a blood culture. On the 8th the condition was the same and 10 c.cm. scarlatina streptococcus antitoxin (B. W. and Co.) were given intramuscularly. Next day 2 oz. of thin purulent fluid aspirated from right pleural cavity which on culture showed abundant growth of *S. hæmolyticus*. 10 c.cm. of serum (B. W. and Co.) were given intramuscularly. On both the 10th and 11th 20 c.cm. serum (B. W. and Co.) were administered, and on the 12th 20 c.cm. of serum (P., D. and Co.) were given and both membrana tympani were incised. On the 13th 3 oz. of thin purulent fluid were aspirated from the right pleural cavity. Both ears were discharging freely, and 20 c.cm. of serum (P., D. and Co.) were given. Next day the dose was discontinued because the child was becoming frightened by the injections and was resisting. On the 15th a profuse septic rash appeared on back, abdomen, and thighs. The general condition appeared to be worse and temperature and pulse-rate, which had previously been falling, rose again to 104° F. and 120. For this reason 20 c.cm. of serum (P., D. and Co.) were again given, and this dose was repeated on the two following days. On the 19th the general condition was much improved and the temperature steadily falling. On the 22nd the temperature again rose to 103·2° F., but the local condition in the lungs was clearing and the general condition improving. From this time there was steady progress towards recovery. During the next three days the temperature came down to normal and the patient made an uneventful recovery.

Dosage.

More than one brand of antitoxin was employed in two of the cases, but there is no evidence to show that one was any better than the other. The best method of injection and the most desirable quantity of serum have yet to be determined. In Sanderson's cases, and in the above four (with one exception), the injections were given subcutaneously or intramuscularly, and never more than 20 c.cm. at a time were administered. On the other hand, Burt-White, for reasons unstated, has abandoned the intramuscular method and never gives less than 20 c.cm. intravenously, and in some cases as much as 100 c.cm. at a time. Of course, the mode of procedure in this respect must largely be regulated by the condition of the patient, but it seems reasonable to aim at giving not more than is necessary to produce the maximum effect—more especially when the intravenous route is employed, for L. A. Tooney[5] has shown that this method is not without risk.

Assuming for the sake of argument that the recovery of Case 2 was due to the antitoxin, the cure was obtained by the injection of only 10 c.cm. intravenously and three intramuscular injections of 10 c.cm. each, and this case was considered to be in extremis before the treatment commenced. Sanderson's case of otitis media was equally bad, and this responded to six intramuscular injections of 10 c.cm. each.

Then again, Case 1 only received one intramuscular and three subcutaneous injections amounting to 50 c.cm. in all. These results suggest that it is not essential to employ large doses and the intravenous route on every occasion, but, of course, not much reliance can be placed on the behaviour of so few cases. It is to be hoped that this and other publications on the subject have brought forward sufficient evidence to justify fuller investigation of this method of treatment.

In conclusion I have to thank Dr. N. B. Farman and Mr. E. K. Martin for supplying me with particulars and giving me permission to publish Case 1, Mr. C. D. Read for Cases 2 and 3, and Dr. C. K. J. Hamilton for Case 4.

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Clinical and Laboratory Notes.

A CASE OF SUBACUTE ATROPHY OF THE LIVER, ASSOCIATED WITH ACHLORHYDRIA.

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ALTHOUGH few are in agreement on the ætiology of acute liver atrophy yet many concur with Flexner [1] and White [2] that the process is autolytic in nature, and that a liver-cell degeneration permits the escape of active enzymes which give rise to autodigestion.

Pregnancy has long been considered a cause and many cases have been definitely traced to arsenical treatment in syphilis, but Herxheimer and Gerlach [3] collected 69 cases of acute atrophy of the liver in syphilides who had not been treated with arsenic. They regarded the toxin as a product of the treponema. Atophan and trichlorethane, as well as arsenic, have been found to be causal (MacDonald [4]). Bacteriological inquiries have yielded a diversity of findings, for Hayashi and Kibata [5] isolated colon bacilli, staphylococci, streptococci, pneumococci, and spirochætes in their series of cases. In 1920 Umber [6] found a constant association of gastro-intestinal catarrh in four cases and concluded that an entero cholangitis was causal. Evans [7] also records a case showing gastro-intestinal symptoms. Verse [8] described a case associated with acute interstitial pancreatitis. These would suggest the common bile-duct as the route taken by the intestinal toxin. Miller and Rutherford, [9] however, found in their study that, although the toxin which caused liver necrosis was of intestinal origin, yet it did not spread along the bile-ducts.

Because the ascribed causes are so numerous and diverse Osler concluded that under acute liver atrophy was grouped a series of disorders which had a superficial resemblance. Nevertheless, a large group of cases has been sufficiently uniform to convince a number of observers—Miller and Rutherford, Wells, [10] Fischer, [11] and Umber—that the toxin is of intestinal origin.

The case to be described is interesting because of a definite history of gastric disorders; here, although active gastritis was present at the time of death, the bile-ducts showed no indication of an invasion along that route. Owing to the length of time the patient

was under observation a more complete clinical investigation was possible than is usual in these cases.

The patient, an unmarried woman aged 22, was admitted to hospital on Nov. 6th, 1928, complaining of diarrhœa and jaundice. Before April, 1927, she had enjoyed good health; then diarrhœa commenced, chiefly in the morning, and was associated with griping pains. This continued intermittently, but was severe in July and November, 1927; it necessitated confinement to bed and was accompanied by blood in the stools. In November, 1927, jaundice appeared for the first time; the stools were clay-coloured and the urine dark. The jaundice persisted for nearly eight weeks. In January, 1928, jaundice returned and was accompanied by malaise, drowsiness, and occasional vomiting. The diarrhœa continued throughout the illness, varying in severity, and streaks of blood were occasionally seen in the stools. In March, 1928, she was admitted to hospital, and we are indebted to Prof. F. E. Tylecote for details of the investigations then made.

At that time there was definite jaundice with clay-coloured stools and bile in the urine. The liver and spleen were not palpable and the other organs appeared normal. The Wassermann reaction was negative and a blood count gave the following result: red blood cells, 6,080,000; white blood cells, 8000; hæmoglobin, 88 per cent.; colour-index, 0·7. A fæcal examination showed pus cells, and a non-hæmolytic streptococcus was obtained in pure culture. No typhoid or dysentery organisms were isolated. Another culture, made a month later, yielded no distinctive organisms. A blood culture was negative. Van den Bergh's reaction was biphasic and fragility tests showed no abnormal hæmolysis.

When she left hospital six weeks later the jaundice was better, but the diarrhœa continued, and ten days later she developed a pleural effusion from which, however, no organisms were isolated. In a month's time she was practically well again, but in June, 1928, the diarrhœa recommenced and in September the jaundice also; these continued until November, 1928, when she was seen by one of us and readmitted to hospital.

At this time she complained of vomiting and general malaise in addition to the diarrhœa and jaundice; the urine was bile-stained and the fæces clay-coloured. Definite clubbing of the fingers was present, but, apart from slight tenderness over the sigmoid colon, there were no other physical signs, and the liver and spleen were not enlarged. A blood count showed: red blood cells, 3,912,000; white blood cells, 6400; hæmoglobin, 69 per cent.; colour-index, 0·88 per cent. A curve after 50 g. of lævulose gave the following percentage results: fasting, 0·0512; half an hour, 0·111; one hour, 0·116; one and a half hours, 0·089; two hours, 0·081. A glucose tolerance curve was normal. A fractional gastric analysis showed a complete absence of free acid and the total acidity = 1 c.cm. N/10 NaOH to 100 c.cm. of gastric contents. A trace of bile was present. The peptic activity also was diminished.

The patient was given a drachm of dilute hydrochloric acid thrice daily after food, and this was continued to within a few days of her death. It was followed by immediate improvement; the diarrhœa almost subsided and the jaundice was much improved. She was discharged convalescent on Nov. 19th, 1928.

She was seen again in January, 1929, and reported that the motions were reduced to two or three a day and that, though there was still a slight tinge of jaundice, the urine was free from bile. In April, 1929, there was another slight attack of diarrhœa but she was otherwise well and had put on 4 lb. in weight. Slight jaundice was still present. Another gastric analysis was done at this time and still showed a complete absence of free hydrochloric acid.

In the middle of July, 1929, the diarrhœa returned and the jaundice increased. She was readmitted to hospital in a state of collapse. The stools contained much blood, vomiting was profuse, and she was drowsy with occasional delirium. The temperature was 101° F. and the pulse-rate 104. She was too ill to be examined thoroughly, but a diminution of liver dullness was noted and pressure in this region caused much distress. The drowsiness increased to coma, and death occurred on August 3rd. Neither leucine nor tyrosine were found in the urine.

Post-mortem Examination.

The autopsy was done about 36 hours after death. The body was that of a well-developed young adult female. The whole skin surface was intensely jaundiced. The whole pericardial sac was obliterated by fibrous adhesions. The heart (weighing 400 g.) was enlarged, the myocardium pale and very soft, and the endocardium hæmorrhagic on the left side. The right side was dilated. The aorta showed considerable bile-staining. The right lung weighed 500 g. and the left lung 420 g. Apart from fibrous adhesions over both lower lobes and congestion throughout both lungs, there was no macroscopic abnormality. The mucous membrane of the stomach was dull grey and well preserved and showed numerous thickened plaques, especially towards the pyloric end. The small intestine contained altered blood in the bowel contents. A dark nodule of about 0·75 cm. in diameter was noted in the transverse colon. The peritoneum over the stomach was acutely congested. The liver (weighing 880 g.) was adherent to the diaphragm and to the anterior abdominal wall. The organ was small and soft, but there was only a slight amount of puckering in the fresh specimen. Through the capsule were visible very numerous small patches (1 to 3 mm. in diameter) of an intense yellow colour. On the sectioned surface these small, yellowish, nodular areas were abundant. Close examination showed the liver lobules to be absent and the liver substance not recognisable. Scattered throughout were red and dull brownish coloured areas. The common bile-duct was large and gave free passage to the bile. Scattered over the lower portion were a few hæmorrhagic areas, but on the whole the duct showed no lesion of any importance. In the pancreas no abnormality was observed. The spleen (weighing 220 g.) was congested. Both adrenals appeared to be normal. Both kidneys (each weighing 160 g.) were pale and yellowish, but the cortex showed considerable congestion.

Microscopic examination revealed a moderate amount of fatty degeneration of the myocardium, numerous pyknotic nuclei, and abundant fragmentation and segmentation of muscle-fibres. The stomach showed an acute gastritis with infiltration of the submucous and muscular zones. The mucosa of the fundus contained numerous parietal or acid-forming cells, but these did not react strongly to eosin and many were faintly basophilic. The transverse colon showed a slight degree of inflammation involving the mucosa and submucosa and also possessed a mucous polyp.

In the liver the parenchymal cells were necrosed throughout. One could discern, however, that before the last attack, which had resulted in the acute atrophy, a subacute condition had existed. Throughout the sections were islands of liver cells which had been surrounded by wide areas of fibrous tissue containing proliferated bile-ducts and groups of small round cells, but the greater portion was made up of extremely necrosed liver cells, collapsed stroma containing capillaries, and much debris.

This was a case of acute liver atrophy which had developed on a previous subacute condition; the final destruction involved both the newly formed and the original liver cells as well as the proliferated bile-ducts.

In the pancreas some lipomatosis had taken place, but post-mortem changes prevented any minute observations. In the spleen considerable hyperplasia was evident as well as passive congestion. The kidneys showed a few small scars but nothing of any consequence could be made out; here also there was a certain amount of post-mortem change.

In this case the long history of digestive troubles seems to leave little room for doubt that the source of the infection was the intestinal tract, and it appears probable that the absence of the antiseptic action of the gastric juice was a predisposing factor. It is impossible to say whether achlorhydria had been present throughout life, but the fact that it was present in April, 1929, at a time when the patient's general condition was good and the digestive symptoms had subsided, suggests that it had. The association of diarrhœa with achlorhydria is well known; it can be relieved by the administration of acid, as occurred here, although unfortunately the benefit was only temporary.

In conclusion, we wish to express our indebtedness to Dr. J. F. Wilkinson, of the Research Department of the Manchester Royal Infirmary, who made the gastric analyses for us.

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A CASE OF
LANDRY'S PARALYSIS OF DESCENDING TYPE.

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With Pathological Note by

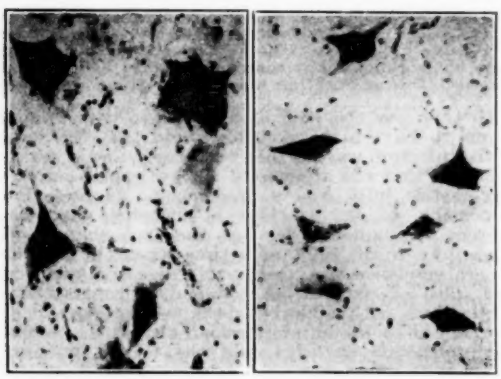
Dr. J. G. Greenfield, *and* Dr. Norah Schuster.

This case warrants description as an example of Landry's paralysis, confirmed by histological examination, and showing clinically the unusual feature of onset in the upper extremities.

The patient, a cashier, aged 43, was first seen by one of us (J. W. F. J.), on May 5th, 1927. She complained that while trying to pick up a bag of money with her left hand she had noticed a sudden loss of power in the left hand and arm. She had finished the day's work, using her right hand only. When seen in the evening the grip of the left hand was extremely weak, the right hand being normal. On May 6th the grip of the right hand became impaired, and in the course of the next two days the right arm became as weak as the left; there was practically complete paralysis of both arms. On May 10th weakness of both legs developed; this gradually increased up to the 13th, when she was seen by us both in consultation, and it was decided to move her to the Weir Hospital.

The *previous history* had been good, apart from chronic constipation. A few weeks before the onset of this illness she had had an "influenzal cold," and from the time she first came under observation it was noted that she had nasal catarrh, and a cough with scanty expectoration.

Fig. 1. Fig. 2.



Sections from spinal cord at level of the fourth lumbar vertebra (Fig. 1) and from hypoglossal nucleus (Fig. 2); some of the cells show achromatosis and some are normally stained

On admission to hospital she looked quite well in herself, and, apart from the excessive weakness of all the extremities, made no complaint of pain or other subjective symptoms. There was, however, extreme constipation and difficulty in micturition. On catheterisation 32 oz. of urine were withdrawn. The tongue was thickly coated, the fauces were injected, and muco-pus was seen in the pharynx. The cardiovascular system was normal. Râles were heard at the bases of both lungs. The abdomen was noticeably distended.

Examination of the central nervous system revealed no abnormality of the cranial nerves. The upper extremities were in a state of complete flaccid paralysis below the shoulder. Tendon jerks were only obtained with great difficulty, with the arm supported in the optimum position. Cutaneous sensations and muscle pain sense were present and normal. The lower extremities showed a similar condition of complete flaccid paralysis with normal sensation; tendon reflexes were obtained with difficulty, but the plantar response was flexor. Electrical reactions showed no response whatever to faradic current (Stuart and Bristow coil). Her temperature was 97·8° F., pulse-rate 72, and respiration-rate 20.

Lumbar puncture was performed, but revealed no obvious increase in pressure. The fluid was clear with no excess of albumin; the globulin test for excess was positive, slight opalescence appearing with ammonium sulphate. The sugar content was normal. A diplobacillus was present in the deposit, but was probably a contaminant. A cell count was impossible owing to delay in transit.

During the next three days the temperature rose to 100° each evening, and there was an increase of cough. On May 19th breathing became laboured, owing to interference with the diaphragmatic movements, and tubular breathing was heard at the left base. At 5.30 on May 20th the patient suddenly collapsed and died. Half an hour previously she had been perfectly conscious and in no pain.

Autopsy by Dr. Norah Schuster (Report on Specimens Received).

The specimen of lung showed broncho-pneumonic consolidation. The spleen was congested, but cultures from the pulp were sterile.

Sections of the spinal cord and peripheral nerves were stained by the following methods: (*a*) Sharlach R. (*b*) Hæmatoxylin. (*c*) Van Gieson. (*d*) Marchi's method for demonstrating degeneration (Nissl's nerve-cell stain).

Dr. J. G. Greenfield examined the sections in this case, sent to him by Dr. Schuster, and reported as follows.

Note by Dr. J. G. Greenfield.

"The changes present in the cord are those which have been constantly described in Landry's paralysis—i.e., chromatolysis of anterior horn cells and congestion of vessels. There was no evidence of degeneration in the emerging nerve-fibres, as shown by Marchi's method; in fact this stain revealed only the lipochrome in the nerve-cells, which was in slight excess of the normal.

"The vascular congestion appeared to affect the small veins chiefly, and the capillaries were not greatly distended. It is possible that it should be related rather to the dyspnœa from which the patient suffered than to a local congestion of the vessels of the cord. Many of the small veins contained very numerous leucocytes in addition to red blood corpuscles, and some were almost packed with these cells, but there was no evidence of thrombosis. At the level of the first thoracic segment there was a small hæmorrhage into the anterior horn, which must have taken place at least some hours before death, as the neighbouring nerve-cells contained dark doubly refractile granules which probably consist of hæmatin or some early decomposition product of hæmoglobin. There was no sign of lymphocytic infiltration either of the meninges or grey matter.

"Chromatolysis of the central type (axonal reaction) was most conspicuous in the large ventral horn cells of the lumbar enlargement. Here it affected almost every cell in varying degree, although at each level one or two normaly staining cells could be seen. The most affected cells were uniformly pale, and their nucleus was eccentric and subcapsular, and often presented an irregular outline.

"In the cervical enlargement also the majority of the cells had undergone a similar change, but in the thoracic region of the cord only one or two cells at each level were affected. In the hypoglossal nucleus and the nucleus ambiguus, similarly, the majority of the cells were normal and only a few cells presented minor degrees of chromatolysis. As a general rule the largest cells seemed to be more severely diseased than the smaller ones, although this appearance may have been due in part to the swelling which the cells had undergone in the process of chromatolysis. Vacuolation of the cell body was never seen. The cells of Clarke's column and those in the dorsal nuclei of the medulla appeared to be quite normal.

"The pathological examination therefore confirms the diagnosis of Landry's paralysis, which may be defined as an acute neuronitis limited to the lower motor neurones. There was no sign of inflammation apart from the vascular congestion which, as has been suggested, may have been due rather to back pressure than to local inflammation."

The diagnosis of Landry's paralysis in this case is founded on the following features: (1) The acute onset and rapid spread of a paralysis involving all the limbs and (terminally) the phrenic nerve. (2) The absence of sensory disturbance. (3) The demonstration in post-mortem sections of the spinal cord and peripheral nerves of an acute degeneration of the

horn cells, and of the myelin sheaths, with no inflammatory reaction. The case presents unusual features in that clinically the paralysis was descending and not ascending; Church and Peterson describe two cases of this type. The post-mortem findings support the view originally put forward by Spiller that the toxic agent, whatever it may be (in this case apparently an acute nasal infection), acts on the lower motor neurones as a whole. Landry's paralysis is a rare disease. Only 16 published cases are on record in the last ten years, and in the majority post-mortem confirmation has been lacking.

ON THE

TRANSMISSION OF MAMMALIAN NEW GROWTHS BY FROZEN MATERIAL.

BY W. CRAMER, D.SC. EDIN., PH.D. BERLIN, M.R.C.S. ENG.

(*From the Imperial Cancer Research Fund.*)

NUMEROUS experiments have been carried out in the past to determine whether mammalian tumours can be transmitted without the intervention of living cells. It was found that the inoculation of cells which had been killed by heat, radium, freezing, or mechanical disintegration gave negative results. Similarly, the injection of cell-free watery extracts of mammalian tumours has yielded negative results, except in the hands of one investigator. In the course of repeating these experiments the injection of watery extracts has given uniformly negative results in hundreds of experiments, if the absence of living cells was ensured by filtration through a porcelain filter, or by spinning and careful removal of the upper layer of the supernatant fluid. On the other hand, the inoculation of material obtained from six different strains of mammalian tumours by a course of repeated freezing and thawing has yielded in one strain a large number of positive results—73 positive results in 209 inoculated mice. This strain is the rapidly growing sarcoma 37 S. strain of the Imperial Cancer Research Fund. Three different rapidly growing carcinoma strains—Nos. 63, 91, 113—gave uniformly negative results. Experiments in the past in which negative results were obtained after freezing or mechanical disintegration were carried out with transplantable carcinomata. Two other rapidly growing sarcoma strains—the Jensen rat sarcoma and the Crocker mouse sarcoma—gave only a very low percentage of positive results, differing widely in this respect from the sarcoma strain 37 S. Thus the Jensen rat sarcoma gave five positive results in 102 inoculated mice; the Crocker sarcoma nine positive results in 79 inoculated mice. The tumours arising by inoculation of frozen material were always identical with the tumours from which the material was obtained. The positive results are not evenly distributed over the successive experiments. Thus, in the strain 37 S. with an average of 35 per cent. of positive transmission, half the experiments gave completely negative results, while the other half gave positive results in a very high percentage varying from 50 per cent. to 100 per cent., with an average of 70 per cent. After two hours' incubation of frozen material of 37 S., which by itself gave a high percentage of positive transmission, the property to transmit the tumour was either greatly weakened or completely abolished.

All attempts to obtain living tissue cultures from material subjected to the same treatment of repeated freezing and thawing have given negative results. Experiments carried out by Mr. H. G. Crabtree show that, contrary to statements in the literature, respiration and glycolysis do not completely disappear after repeating freezing and thawing. They are only greatly diminished. In this respect, however, no difference was observed between the cells of the sarcoma strain 37 S. on the one hand, and normal cells or the cells of the carcinoma 63 on the other, except that the diminution was much greater for malignant cells than for normal cells. The results may be summarised as follows:—

—	Tissue culture.	Metabolism.	Transmission.
Normal cells ..	Negative.	Present but diminished.	..
Carcinoma ..	"	Present but greatly diminished.	Always −
Sarcomata J. R. S.	"		Rarely +
Sarcomata Crocker	"		Rarely +
Sarcomata 37 S.	"		Frequently +

The interpretation of these results depends on what we accept as the criterion of death. If the failure of frozen material to live and grow when cultured in vitro is accepted as evidence that all the cells have been killed, then the results would demonstrate the transmission of at least one strain of a mammalian tumour without the intervention of living cells. The persistence of respiration after freezing and thawing is not necessarily evidence of the survival of a few cells, since in that case the tissue culture experiments should have given positive results and the transmission of the frozen carcinomata should also have given positive results, at least occasionally. The persistence of respiration may merely indicate that the process of repeated freezing and thawing, while destroying the structure of the cell, has left behind protoplasm in which the enzymatic processes of respiration and glycolysis are still proceeding.

On the other hand, it may reasonably be argued as an alternative explanation that the successful transmissions with frozen tumour material are due to the survival of a few living cells. Such an explanation is, however, not without difficulties. If that explanation is adopted one must assume that the sarcoma cells of strain 37 S. are more resistant to the lethal effect of repeated freezing than normal cells, the cells of carcinomata, and even the cells of the two other sarcoma strains investigated. One would further have to assume that the resistance of the cells of sarcoma 37 S. shows considerable variation at different times. As stated above, the quantitative measurements of respiration and glycolysis of frozen material give no indications of any such differences. The absence of all manifestations of life in the tissue culture experiments is also difficult to reconcile with such an explanation.

Since no direct evidence seems available by which this question can be decided it will be necessary to collect and consider circumstantial evidence, such as, for instance, the very evanescent nature of the property of frozen material (destruction by incubation for short periods) on which the power to transmit tumours depends. In any case it is justifiable to point out that until the successful transmissions with frozen material are satisfactorily accounted for as being due to a survival of living cells, the axiom of the non-transmissibility of mammalian tumours without the intervention of living cells is open to doubt.

A detailed account of the experiments on which this short communication is based will be published later.

THE QUEEN'S HOSPITAL, SIDCUP.—We have already announced that this hospital has been purchased by the London County Council for use as a general institution for post-operative cases. The hospital was built in 1917 in the grounds of Frognal House, the residence of the late Earl Sidney, for the treatment of facial and jaw injuries. Between August, 1917, and May 31st last year 18,135 patients were received; the facial cases included 714 officers and 8035 other ranks, and the major operations numbered 11,752.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF PSYCHIATRY.

AT a meeting of this Section held on Jan. 14th the chair was taken by the President, Sir ROBERT ARMSTRONG-JONES, and Dr. MACDONALD CRITCHLEY read a paper on the

PATHOLOGY OF THE SENILE PSYCHOSES.

The modern histological conception of the senile psychoses dated, he said, from the last decade of the nineteenth century, when Alzheimer had sharply distinguished arterio-sclerotic dementia from senile dementia. The distinction was of more theoretical than practical importance, as the cerebral arteries usually shared in the senile changes, though how far they influenced them was quite unknown.

The brain of healthy old age—if there were any such thing—showed a certain amount of atrophy with widening of sulci, reduction in weight, ventricular distension, thickening of the meninges, and sclerosis of the basal arteries. There was a disappearance of a number of nerve cells from the cortex, especially the frontal and prefontal regions, and from the basal ganglia, locus niger, and olives. The cells remaining might show fatty degeneration—the most constant feature—or the intracellular fibrillary tangles of Alzheimer, which varied from simple intensification of the fibrillary network to the reduction of the cell to a mere skeleton made up of tangled densely staining coils. Some believed these structures to be neuroglial, but most authorities regarded them as neurofibrillary. Bouman had drawn attention to a peculiar spindle- or torpedo-shaped swelling of the proximal portion of the axones of the Purkinje cells; the interior was homogeneous, but the periphery was reticular, and vacuolation might occur later. Disappearance of the neurone led to relative demyelinisation, which was most marked in the tangential fibres. Regressive glial changes took the form of a diffuse subpial, subependymal and perivascular gliosis, with frequent monster cells and reticulation. Regressive glial changes included the appearance of rod cells, especially in the molecular layers of the cornu ammonis, mucocytic degeneration of the oligodendroglia, and an increase in the amount of protoplasm in the microglial cells. The neuroglial changes in the cerebellum were essentially patchy, the gliosis being limited to the perivascular zones, the depths of the fissures, the white matter round the dentate nuclei, and the neighbourhood of the Purkinje cells.

The combination of diffuse gliosis with neuronal atrophy led to shrinkage and loss of weight, and hydrocephalus ex vacuo. The shrinkage was often most marked in the regions of the loci perforati posticus and lateralis, where the brain substance fell away from the basal arteries and caused wide perivascular dilatation.

Depositions in the senile brain included corpora amylacea, which appeared especially in the fimbria and round the blood-vessels, but which never aggregated, and senile plaques in the cortical grey matter. These plaques varied in form, but rings, radial figures, stars and discs were common, and there was often an amorphous or cellular nucleus, containing some amyloid-like substance. Sometimes the plaque contained lipoid, but the fatty plaques of Laignel-Lavastine and Tinel were regarded by Rizzo as artefacts. Microglia played a rôle in the formation of plaques, and neurofibrils and sometimes myelinated axis-cylinders were seen. Plaques were now usually regarded as a special type of tissue reaction directed against a specific and toxic metabolic process. A primary involutional alteration in the chemistry of the fundamental ground substance was believed to cause depositions of lipoid or amyloid material in the nervous system; these precipitates were strongly argentophil. They provoked a microglial reaction, and Hortega cells became incorporated in the innermost part and then underwent degeneration. It was doubtful whether plaques often occurred in the absence of psychical change during life.

There was a lack of certain knowledge as to the extent and relative frequency of the various histological changes in the senile brain. The common findings were diffuse fatty degeneration, a moderate degree of atrophy of nerve cells, and glial proliferation.

The Senile Dementias.

The change in senile dementia was in most cases an exaggeration of the histological processes seen in the healthy senile brain; there was no abrupt line of demarcation. This intensification might be selective. Dementia senilis simplex was characterised by an abundance of plaques, especially in the frontal and temporal regions; they might even be found in the central grey matter, the pons, the mid-brain, the cerebellum, and the spinal cord. It was not possible to distinguish the brain of a depressed senile dement from that of an agitated or a confused one. In Pick's disease there was marked localised neuronal atrophy, without any of the other changes except moderate secondary gliosis. The numerical atrophy was most obvious in the three upper cell laminæ of the cortex, and caused convolutional atrophy with widening of sulci. The change was usually symmetrical and often limited to the frontal, temporal, or occipital lobes. There was no explanation of the peculiar distribution. Alzheimer-Perusini's disease was characterised by a preponderating change in intracellular fibrils. The pathology of presbyophrenia had not been determined with certainty; recent studies tended to associate its pathological picture with that of Alzheimer's disease. Claude and Lhermitte had described a diffuse atrophic cortical sclerosis which was distinguished from simple dementia by a preponderating overgrowth of neuroglial fibrils, especially in the cortex. Probably there were other varieties of senile psychosis as yet unidentified. Clinical and pathological phenomena must be correlated with caution. The chemical and physical reactions of nerve tissue to various dyes were at best a very rough measure of the functional integrity of that tissue during life, and the presence of scarred or degenerated structures in the brain had not necessarily any connexion with signs or symptoms observed during life. Pathological findings were the outward signs of a particular type of tissue-reaction to some factor which was the basis of both clinical and pathological anomalies. Simchovicz had pointed out that the brain of a young senile dement was histologically indistinguishable from that of a normal centenarian, but the clinical pictures were widely different. According as the nature of the outside agent varied, so the cerebral histological reaction altered. The common features of senile psychoses were also found in very different conditions—e.g., swelling of the Purkinje cells in disseminated sclerosis, cerebellar atrophies, juvenile paralysis and schizophrenia, and senile plaques in Korsakow's psychosis and tabes. Some parts of the nervous system might be endowed with limited viability and be doomed to die before the rest of the system. Idiopathic Parkinson's disease was a senile process limited to the paleo-striatum; Jakob's senile rigidity showed plaques and other senile lesions in the corpus striatum; and in delayed cortical cerebellar atrophy the signs of progressive cerebellar dysfunction were linked with an atrophy of the paleo-cerebellum. There was urgent need for fuller information about senile cases, and for judicious correlation of clinical and pathological findings.

Discussion.

The PRESIDENT spoke of the difficulty of delimiting senility from the normal. The first function to decline

in senility was recent memory; the nouns went first, then the adjectives, and finally the verbs. In premature senility the new engram might become obfuscated before the age of 40. Next came indifference to ceremonies and courtesies, ending in serious lapses. Cannon had shown that the effects of fear included marked changes in the Purkinje cells. Heredity had very little to do with the age of onset of senility. Moral habits were the first to go; the natural affections also became loosened and might be replaced by hatred. A peculiar characteristic was penuriousness or miserliness. Old people should not be sent to almshouses; they became much worse as the result of cutting off environmental stimuli. They should stay at the hearth among their grandchildren.

Dr. KINGSTON BARTON emphasised the importance of memory, especially from the point of view of the general practitioner. There must be some change in the brain associated with the loss of memory. Remarkably few people over 65 escaped all the changes characteristic of senility.

Dr. A. G. DUNCAN said that the only constant biochemical indication of the metabolic changes of senility was the great increase in blood cholesterol, and asked whether this could be associated with the formation of plaques.

Dr. R. M. STEWART referred to the constant senile increase of cerebro-spinal fluid, which he believed to be proportional to the atrophy. This increase was not found in idiots. The plaques were in no sense necrotic; he asked how they stained with aniline dyes. Pick's disease was often overlooked, being taken for part of the cortical atrophy of old age; the disease was not necessarily limited to the frontal region, and might be related to genetically recent parts of the brain. Subcortical encephalitis had not been mentioned.

Dr. J. H. EARLS asked whether the plaques which arose away from blood-vessels had anything to do with lack of blood-supply, and were comparable to similar changes in the myocardium.

Dr. PERCY SMITH spoke of the correlation of the new pathological findings with clinical observations. Some patients, who might be expected to have senile dementia, recovered, even at an advanced age.

Dr. C. W. BRASHER asked if these atrophic changes were in any way associated with valvular disease of the heart. Cardiac cases were apt to become hallucinated during the night.

Dr. G. W. JAMES said that Alzheimer's disease did not really belong to the senile psychoses; presbyophrenia and senile dementia were the outstanding examples, and were nearly always associated with increase of pressure and of cholesterol in the cerebro-spinal fluid. The latter provided a prognostic point, for if it was low there was some hope of recovery.

Dr. CRITCHLEY, in reply, said he thought that theoretically senile changes and cerebral arteriosclerosis were entirely separate, although they were often coexistent. Subcortical encephalitis was essentially an arterial change. Changes in the choroid plexus were early and marked, and metabolic changes and increased permeability both played an important part in cerebral senility. Toxins which normally could not reach the cerebro-spinal fluid might in these brains be able to get through. Plaques stained only faintly with aniline dyes and required silver stains. The occipital cortex was commonly but the motor cortex very rarely affected in Pick's disease. The cardiac cases were probably associated with an ischæmic condition of the brain.

PURCHASE OF ST. BARTHOLOMEW'S CLOSE.—The governors of St. Bartholomew's Hospital have acquired St. Bartholomew's Close which is at present built over with shops, offices, and warehouses. It is hoped eventually to clear the site and erect upon it a residential college for tudents when means permit.

NORTH OF ENGLAND OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY.

AT a meeting of this Society held at Manchester on Dec. 15th Dr. GORDON FITZGERALD gave a presidential address in which he pleaded for moderation in the "much too prevalent abuse of the trust placed by patient in doctor." He drew attention to the deplorable frequency with which details of illnesses and operations were divulged—the patients being referred to by name and discussed under conditions which left no doubt that the medical attendant was violating the confidence placed in him. He also pleaded for moderation in the extent to which the material advantages were permitted to dominate medical opinions of patients' ailments. Those practising gynæcology must be particularly on their guard against this, he said, for the general ignorance of the pelvic organs made people especially gullible on this subject.

Prof. DANIEL DOUGAL demonstrated radiograms of

An Anencephalic Fœtus.

The patient was a primigravida aged 33, who was apparently three weeks post-mature. The fœtus lay transversely. The breech was distinctly felt to the right but the head was not satisfactorily defined. External version was attempted under anæsthesia but failed. An X ray photograph was taken and the radiologist reported that the cranial vault was not developed, and that there appeared to be defects of the lower cervical and upper thoracic spine. Medicinal induction was commenced, and an anencephalic fœtus was delivered normally 18 hours later.

Dr. ARCHIBALD DONALD said he had recently seen a case in labour with some antepartum hæmorrhage where he could not feel a head. The patient's doctor wanted him to perform a Cæsarean section. He refused, and an anencephalic fœtus was shortly afterwards delivered.—Mr. LEYLAND ROBINSON showed a radiogram of an anencephalic fœtus for which previously he had considered treatment by Cæsarean section.—Dr. J. W. BURNS referred to his "flying fœtus," already reported to the Society, which was diagnosed by X rays.

Dr. W. W. KING reported a case of

Injury to the Rectum

caused by administration of a simple enema after labour. He referred to a case recorded by Prof. Fletcher Shaw in 1922, which resulted in permanent occlusion of the rectum.

In Dr. King's case a simple enema was given to a 6-para three days after a perfectly normal parturition. There was pain during the injection, with some bleeding and immediate swelling of the perineum. On the next day the pain spread to the abdomen, and she vomited. Twenty-four hours afterwards her condition was serious, with signs of peritonitis, and the perineum was enormously swollen and œdematous. The abdomen was opened, and purulent fluid (subsequently found to be sterile) was evacuated. The rectum and sigmoid were greatly swollen and dark blue in colour. A colostomy was performed, the peritoneal cavity drained, and a free incision was made into the perineal swelling.

Convalescence, said Dr. King, was stormy, and a stricture of the rectum resulted about 2½ in. above the anus. Five months later the colostomy was closed, but the stricture still remained, necessitating the regular use of rectal dilators. The hard nozzle of the enema syringe had been inserted into the rectum, and a sample of the soap used showed that it contained more free caustic and carbonate alkali than the British Pharmacopœia standard. He concluded that a soft catheter only should be inserted into the rectum.

Prof. FLETCHER SHAW referred to his case, in which the injury had been caused during labour, and he had not seen it until three months later.—Miss RUTH NICHOLSON had seen two cases, in one of which the injury had occurred just before delivery and the

other some time before the completion of labour. In the latter forceps were used to complete the delivery, which was followed by sloughing of the rectum and vaginal walls, and the prolapse of gangrenous loops of tissue out of the cavity, much resembling coils of small gut. This was followed by the death of the patient. Mr. KELLY had seen a similar case which he believed to be due to sloughing of the rectal mucous membrane, the enema fluid having been too hot when injected.

Prof. FLETCHER SHAW described a case of

Acute Sacculation of the Uterus.

This patient was a primigravida, 31 years old, and about three months pregnant. After two days' severe abdominal pain a cystic tender swelling was discovered on the upper surface of the uterus and of about the same size as the uterus. The swelling proved to be a thin-walled sac of uterine wall, and its cavity communicated with the cavity of the uterus by an opening which admitted two fingers. Both the sac and the uterine cavity were lined by fœtal membranes, and the fœtus moved freely from one to the other. The placenta was within the uterine cavity.

Two years later, said Prof. Shaw, the abdomen was again opened, and a slight groove could then be detected running across the fundus down both the anterior and posterior walls of the uterus which gave rise to the suspicion that there was some weakness at the place of fusion of the two Müllerian ducts, and that this place was unable to withstand the extra pressure due to the growing ovum, and so stretched to form this thin-walled sac.

Dr. J. W. BRIDE had seen a similar case in a primipara, but the whole uterus was involved.—Dr. DONALD had seen an infantile uterus becoming pregnant; the wall was very thin, but the patient had a normal labour.—Mr. J. ST GEORGE WILSON (Liverpool) suggested that the case was one of incomplete rupture of the body of the uterus.—Dr. S. B. HERD (Liverpool) suggested that there was malunion between the two halves of the uterus.

Prof. DOUGAL read notes of a case of

Hydradenoma of the Vulva.

The patient was a single woman, aged 52. There was a small cauliflower excrescence on the vulva about half an inch in diameter, pinkish in colour and situated on the left labium minus, a short distance below its bifurcation. The growth was removed locally and examined microscopically. The vulva was excised four weeks later. Prof. Shaw Dunn reported that the growth was an adenoma hydradenoide.

In these tumours, said Prof. Dougal, the growth resembled a small cauliflower projecting outwards beneath the epithelium. It was covered by stratified squamous epithelium which in some places was much thickened and in others worn away by friction. Leading down from the surface epithelium were several duct-like tubes which could be seen to merge with the mass of tubules of which the main tumour proper was composed. The tubules formed a complicated system, but were of uniform appearance, being lined by two layers of cells, an inner cylindrical and an outer cuboidal. In places there were masses of cells strongly suggestive of malignancy. The tubules resembled the ducts of sweat glands, and the tumour had evidently originated in one of these structures. The literature showed the difficulty of deciding whether these tumours were malignant. Outerbridge and Schwartz regarded as malignant any tumours of this type in which the acini had invaded the stroma or in which masses of polyhedral cells were found in the same situation. He had done a radical operation in this case because of the masses of polyhedral cells seen in his sections.

Sections showed the tumour to be a rapidly growing fibrosarcoma.

Prof. DOUGAL also reported a case of

Malignant Body of Uterus Incarcerated in a Procidentia.

The patient was a single woman, aged 58, and five years past the menopause. She had had prolapse for five years, and for the last four years it had been complete. Her main complaint was severe pain in the lower abdomen and in the procident mass; this was evidently due to incarceration of the contents, for the prolapse could not be reduced. There had been some irregular hæmorrhage for two weeks. Vaginal hysterectomy with colporrhaphies was performed. The uterus contained a large necrotic growth which proved on section to be an endothelioma. The right ovary contained a nodule of similar growth.

The points in this case were: (1) the occurrence of complete prolapse in a nulliparous woman; (2) incarceration of the enlarged uterus in the procidentia; and (3) the nature of the tumour—an endothelioma.

Mr. N. L. EDWARDS (Derby) showed a specimen of primary squamous-celled carcinoma of the vagina, and Prof. DOUGAL demonstrated radiograms from a case of intestinal carcinoma, and described a case of sarcoma of the broad ligament.

AUSTRALASIAN COLLEGE OF SURGEONS.

ANNUAL STATE MEETING IN QUEENSLAND.

AT the meeting of the College held in Brisbane on Nov. 15th, 1929, an address was given by Dr. R. B. WADE, of Sydney, on

LEFT LUMBAR RAMISECTION IN HIRSCHSPRUNG'S DISEASE.

The condition, said Dr. Wade, was described first by Parry in 1825. Of the many theories advanced to explain the causation that of neuromuscular incoördination was most widely accepted. There was the double innervation of the bowel to bear in mind, and the various sphincters, particularly that described by O'Beirne at the pelvirectal junction. Two theories of the action of the sympathetic were held: (1) that it was the active agent in causing contraction of the sphincters, (2) that its function was to maintain postural tone (Hunter and Royle). In this way the viscera adapted themselves to changes in volume of their contents, and the sphincters contracted until the call came for the passage of the contents. On the one theory there was active contraction, on the other an absence of relaxation; in either case overaction of the sympathetic would give the same result. With the former view hypertrophy of the sphincter would be anticipated.

In the development of the child, Dr. Wade went on, the inhibitory apparatus lagged behind the motor and was last acquired. In infantile achalasias, such as those at the cardia and pylorus, the time limits of the obstruction appeared definite, and if the child survived until the time that inhibition was acquired it would recover. This did not appear to apply to achalasias of the rectum. The achalasias appeared at different periods; they might occur in the very early days of life as a result of incoördination, or in later life owing to a local degeneration of the neuromuscular mechanism. Hurst considered the disease to be due probably to an incoördination resulting in failure of relaxation at either the pelvirectal sphincter or the internal sphincter ani. In Hirschsprung's disease there was no proof of hypertrophy of either of these sphincters, and clinically there was no spasm. Dr. Wade, however, quoted three examples which suggested some form of obstruction occurring at the pelvirectal sphincter in these patients.

The three cardinal symptoms and signs were constipation, abdominal distension, and peristaltic waves; of these the latter might be absent in the milder cases. Constipation was the predominant symptom. Attacks of abdominal distension occurred, associated with vomiting; these usually were relieved by freely emptying the pelvic colon. X rays showed the bowel evenly distended with a smooth contour and an absence of haustration. Administration of insufficient enema might cause fallacies; a baby suffering from Hirschsprung's disease could retain 1½ pints, an older child 2 pints. In treatment, diet alone had not been a great success; a daily purge

and enema would keep the child in moderately good health; dilatation was stated to have had some success. In ileosigmoidostomy and colectomy the anastomosis must be made above the sphincter; following it the dilatation reproduced itself in the ileum.

A Series of Cases Described.

Operation on the sympathetic, as suggested by Dr. N. D. Royle, had been carried out in 13 patients, with, in the main, satisfactory results. In this operation, an exposure of the left lumbar trunk of the sympathetic was made through a lumbar incision, somewhat similar to that exposing this part of the ureter. The nerves severed were the white ramus from the first lumbar nerve to the first lumbar ganglion and, if there was a large branch from the second nerve to the second ganglion, this also was divided. All the branches (usually four) leaving the ganglion on the medial side, and one from the first and second ganglia, and one or two smaller ones from the fourth were severed, and the cord cut across below the fourth ganglion. Operation on the left side only was found to be sufficient in all the patients except one. Dr. Royle had shown in experiments on goats that when this operation is carried out on both sides, though no actual paralysis of the sphincters occurs, micturition and defæcation become more frequent.

Thirteen patients were submitted to operation, their ages ranging from one month to 12 years. There was one death, that of a child, who died from pneumonia two months after operation. One child showed no improvement until the operation had been performed also on the right side. The remaining children showed considerable improvement in their general condition and constipation was relieved, while the abdominal distension and dilatation of the colon remained unchanged. There was, however, a gradual decrease in the size of the abdomen and in the calibre of the distended colon. In the first patient, operated on in August, 1926, the abdomen was now almost flat, although a distended pelvic colon was palpable; X rays taken some years after the operation showed haustration in the ascending colon. The operation relieved the constipation completely. The improvement manifested itself soon, but not necessarily immediately, after the operation. Care must be taken to ensure regular habits.

Dr. Wade also described the case of a girl aged 19, suffering from visceroptosis with marked constipation, in which the operation was carried out. The excellent result obtained suggested that this was a somewhat similar condition of neuromuscular defect.

SHEFFIELD HOSPITAL FINANCE.—The budget for 1930 of the Sheffield Joint Hospitals Council estimates the expenditure of the four voluntary hospitals of the city at £159,935; the expenditure of the council services is put at £28,000. The ordinary income of the four hospitals, apart from receipts from the penny-in-the-pound scheme, is estimated at £42,381, and the amount to be raised by the Joint Hospitals Council at £145,744.

WORKSOP POOR-LAW INFIRMARY.—Mr. Arthur Neal, chairman of the Sheffield Board of Guardians, last week opened extensions of this infirmary at Kilton Hill. The enlargements include a new administrative block and nurses' home, and rooms for the medical and nursing staff. Mr. Neal pointed out that, when the work of the guardians is taken over by the county council, it will be necessary to extend existing institutions or build new ones if waiting-lists were to be done away with.

ST. MARY'S HOSPITAL, PORTSMOUTH.—Dr. R. C. Macpherson, the medical superintendent of this hospital, states that the record of its nurses in the State examinations "has never been beaten by any institution in the country." They held a record of 100 per cent. successes for two years and nearly 100 in the other three years. "Only on one occasion, and that for one year only, has any other institution gained 100 per cent. success in that examination." The hospital contains 1000 beds and the daily average of patients is 950. It is not a surgical hospital, but last year there were 800 operations.

Reviews and Notices of Books.

PUBLIC HEALTH AND HYGIENE.

Public Health and Hygiene in Contributions by Eminent Authorities. Second edition. Edited by WILLIAM HALLOCK PARK, M.D., Professor of Bacteriology and Hygiene, University and Bellevue Hospital Medical College, and Director of the Bureau of Laboratories of the Department of Health, New York City. Philadelphia: Lea and Febiger. Pp. 902. 89.

THE second edition of this book, which has been thoroughly revised and brought up to date, is a welcome addition to the rapidly growing literature of preventive medicine. It is divided into 34 chapters contributed by 24 well-known writers, each dealing comprehensively with his own particular specialty. The work is really a series of authoritative monographs so planned that while each is in itself a complete résumé overlapping and repetition are avoided and the finished product is a homogeneous and concrete whole. The treatment of public health problems is, of course, essentially American, but there are many references to English and continental standards and practice.

Almost one hundred pages are devoted to bacteriology and immunology as applied to public health, including a full description of modern methods of diphtheria prophylaxis—a subject of which Prof. Park writes with the authority of a pioneer. The claim that this procedure confers life-long immunity against diphtheria, however, must be regarded as premature; the statement that sewer gas predisposes to this disease seems out of place in a work containing so much sound, modern teaching. We doubt whether the recommendations of the American Public Health Association for the community control of influenza (pp. 98–103) deserve the space accorded them in a work of this kind. Again, the absolute isolation of public institutions for the whole of an influenza epidemic, and for some weeks before and after, is a counsel of perfection which under modern conditions hardly permits of practical application. In view of the reports from Canada as to its value it is surprising to find no reference to the serum treatment of anterior poliomyelitis (p. 117). The emphatic statement that vaccination is the only satisfactory means of controlling small-pox requires some modification in the light of modern experience of the non-classical type of the disease, about which nothing is said, and the assertion that there are no contra-indications to vaccination takes no consideration of work on post-vaccinal encephalitis. Not many of our cities can have been so fortunate as New York, where (p. 144) "there has not been a death for several years from any complications of vaccination." It is disappointing to find the consideration of the differential diagnosis of small-pox compressed into a rather unhelpful footnote. A separate chapter is given to aseptic technique in the handling of communicable diseases; the busy medical superintendent of a large fever hospital in this country is likely to reject the scheme outlined as impracticable, by reason of the time involved in its execution and difficulties of staffing. The section on epidemiology (pp. 248–259) is eminently practical and concludes with a recital of some of the unsolved problems in the transmission of communicable diseases, together with a plea for combined effort in their elucidation. The subject of ventilation is thoroughly dealt with; the British reader will be astonished to learn that the Americans were first in the field with the modern conception that physical rather than chemical factors are responsible for the vitiation of the atmosphere.

The present state of our knowledge of vitamins is described in a useful section in which irradiated milk is strongly advocated as a potent agent in the prophylaxis of rickets. The American preference fod cleaned rather than clean milk appears again anr

again. One wonders what were the *B. coli* contents of the samples in which total bacterial counts were measured in millions per c.cm. In their regulations for controlling milk-supplies the Public Health Council of New York State include the power to examine body discharges of workers in pasteurised and general milk-supplies. A useful note is that on oyster contamination viewed from the bacteriological aspect. The figure for the incidence of defective vision among school-children, suggested by the American Council of Eyesight Conservation (60 per cent. so defective as to need correction), astonishes us, and that for juvenile mental deficiency (2 per cent. of the population) is also surprisingly high. The procedure described for the school exclusion of infectious diseases contacts seems unnecessarily cumbersome; the treatment of ringworm of the scalp recommended (p. 691) is much less effective than X ray therapy. Useful sections are those dealing with social and economic factors in relation to disease transmission and infant mortality. Those on mental hygiene and maritime hygiene are also good; in the latter the amount of sulphur necessary for effective ship fumigation is, however, overstated and no reference is made to the International Convention of Paris, 1926. The value of mental hygiene in relation to the child guidance movement and the prevention of juvenile delinquency is clearly stated, and the rôle of the nursery school as a promoter of mental hygiene is convincingly explained.

We have indicated places where it seems that further attention might well be employed in the improvement of the book, but the suggestions for emendation are few when its scope is considered, while of its value for reference there can be no doubt.

STARLING'S PRINCIPLES OF HUMAN PHYSIOLOGY.

Fifth edition. Edited and revised by C. LOVATT EVANS, D.Sc., F.R.C.P., F.R.S., Jodrell Professor of Physiology in University College, London. The chapters on the Central Nervous System and Sense Organs revised by H. HARTRIDGE, M.A., M.D., Sc.D., F.R.S., Professor of Physiology at St. Bartholomew's Medical College. London: J. and A. Churchill. 1930. Pp. 1039. 21*s*.

IT is satisfactory to find that this well-known book, which has assisted generations of students through the higher examinations in medicine and physiology, is not to pass away with its original author. Prof. Lovatt Evans states in his preface to the fifth edition that Prof. Starling asked him to revise the work immediately after the war, but that he was unable to do so then. After Starling's death, however, he felt compelled to accept a task which it was clearly his colleague's wish that he should undertake. It is not necessary at this stage to describe the contents, aims, and objects of this work. One who wishes to obtain a sound knowledge of physiology can do no better than read it carefully and to make it the foundation of his knowledge. This applies equally to men working for their medical examination or for more advanced ones, such as the primary fellowship or the higher examinations in medicine. If students read this book thoroughly and carefully before proceeding to speculative and possibly transient monographs, the examiners for higher degrees would not so frequently encounter candidates whose general physiological knowledge is sadly defective.

The most notable addition to the book is the complete revision of the chapters dealing with special senses and the central nervous system by Prof. H. Hartridge. The last-named section contains a whole series of chapters or parts of chapters on postural reflexes, group control, and conditioned reflexes. The section on the physiology of muscle and nerve reflects the teaching of Prof. A. V. Hill and his co-workers, and in itself provides an almost complete monograph. The subject of oxidation and reduction in the animal body seems unduly compressed. In hardly more than two pages Prof. Lovatt Evans has certainly summarised the new work admirably, but no mention has been made of the oxidation reduction potential theories, and reference to the work of Otto Warburg might well have been expanded; only some two or three lines are devoted to this important work on tissue respiration and glycolysis—indeed very little is said about glycolysis anywhere in the book. The section dealing with gastric secretion is rather involved. The methods for investigating normal human stomachs are not described until comparatively late in the chapter, when the fractional method of gastric analysis is dealt with. In his desire to include all the latest work on the subject Prof. Lovatt Evans has included observations which contradict each other. The section on metabolism has been altered considerably, and the most recent views on insulin have been included. Perhaps the greatest changes involve the section on reproduction. This section now includes much recent work on the ovarian and œstrus-producing hormones; the relationship between the secretion of the anterior lobe of the pituitary and ovarian function is not discussed.

The work as a whole commands whole-hearted admiration; it will undoubtedly remain one of the most popular standard text-books on physiology in our language.

PULMONARY TUBERCULOSIS.

La tuberculose pulmonaire: guide du malade et du prédisposé. By Dr. JACQUES STEPHANI, Montana. Paris: Payot. Pp. 314. Fr.25.

IN 1928 Dr. Stephani wrote a small book in English entitled "Consumptive," to which this is complementary. Both books are written in large measure for the guidance and instruction not only of the medical man, but of the patient. It is addressed to a class of patients, differing markedly in their psychology from any other class. The amazing optimism, the cheerfulness of the young person suddenly deprived of liberty, the alternating phases of exaltation and depression, are familiar to all those who have to do with the tuberculous patient, and cannot be lightly dismissed. The fact that many of these patients study any medical book dealing with their condition, often to their mental distress, makes us view with sympathy a book such as this one, written in an encouraging style by a physician who is possessed of genuine knowledge of his subject. It can do no patient harm to read the heading to Chapter XIV., "Pulmonary Tuberculosis is the Most Curable of all Chronic Diseases," and he will be greatly helped in his fight by a study of the delightful Japanese fable at the introduction to Chapter XXIV., in which the author deals with the grave question of the personal responsibility of the patient. The book is written in simple and not over-technical language. It omits nothing of importance, and may be read with profit by all whose daily work brings them in contact with that most delightful, though possibly difficult patient—the individual who has been notified as suffering from pulmonary tuberculosis. Such a patient may at first be apt to regard himself as isolated from the rest of humanity. His reactions to the realisation of the fact that his mode of life and his activities have been profoundly altered, and that the change must last for a long period of time, will be favourably influenced by the study of this book.

La pratique du pneumothorax et de la collapsothérapie chirurgicale. By F. DUMAREST and P. BRETTE. Paris: Masson et Cie. 1929. Pp. 409. Fr.50.

THIS is a very complete account of the treatment of pulmonary disease by collapsing the lung. The first nine chapters deal with artificial pneumothorax. Many different types of apparatus used for this purpose are described, some very simple and others complicated, but all effective, so that the choice of apparatus really becomes a matter of individual preference. The authors point out that a pneumothorax depends on the elasticity of the lungs and on

the respiratory muscles, and that it is not merely a matter of compressing the lung by so much pressure of air. The collapse depends upon the individual. The immediate and late results of pneumothorax treatment are given, and there is a good discussion of the vexed question of when the lung should be allowed to re-expand. A chapter is devoted to bilateral pneumothorax, and the effects of collapsing both lungs simultaneously are compared with those of collapsing first one lung and then the other. The last chapter deals with phrenicotomy and thoracoplasty, and the indications and advantages of these surgical methods are compared with those of artificial pneumothorax. The book is very readable, and has a full list of references.

ULTRA-VIOLET RAYS.

Ultra-violet Rays in the Treatment and Cure of Disease. Fourth edition. By PERCY HALL, M.R.C.S., L.R.C.P., Hon. Actino-Therapist, Mount Vernon Hospital. London: William Heinemann, Ltd. 1929. Pp. 248. 12*s.* 6*d.*

THE fourth English edition of this manual—there have also been two American editions—has been brought up to date and contains some new features. Two new chapters, one on self-administration and one on dosage, will prove of value to the beginner. The information given in this popular introduction to actinotherapy is clear and accurate, although elementary in its presentation. There is a laudable attempt to avoid speaking of "ray-therapy" as a whole, and the author is at pains to point out that waves of different wave-lengths may initiate very different if not opposing reactions. Dr. Percy Hall is an enthusiastic believer in actinotherapy for selected cases of pulmonary tuberculosis. Unlike most other workers in this field he makes extensive use of the tungsten-arc lamp and in cases of laryngeal tuberculosis directs both the light and the fumes of this lamp into the air passages. In his introduction to this manual Sir Henry Gauvain states that he has used Dr. Percy Hall's tungsten-arc lamp with excellent effect, and that the good results obtained by the author will induce others to follow in his footsteps.

EMBRYOLOGY AND ANATOMY.

The Essentials of Human Embryology. By GIDEON S. DODDS, Ph.D., Professor of Histology and Embryology, School of Medicine, West Virginia University. New York: John Wiley and Sons. 1929. Pp. 316. 20*s.*

FOR some years past a steady flow of books on embryology has set in from across the Atlantic, any one of which might, in many ways, serve in place of one of the others if this were by mischance mislaid. Most of them give the reader beautiful figures showing the gymnastic contortions of chromosomes, other beautiful figures with which we have been on intimate terms since the earliest days, and still more beautiful figures of sections of chicks or pigs or other interesting but non-human embryos. They provide as a rule good accounts of the early conditions and general questions connected with development, and then furnish quite inadequate and sometimes misleading descriptions of organogenetic processes. There seems to be a desire to cut down details of the actual formative occurrences in the various parts of the body to a minimum. Surely this is not the right way to make the development of the body of value; it would seem that the standard adopted was set by an examination syllabus rather than by a wish to give some understanding of the subject to the reader. One knows what one will find before opening one of these works. They all grind out the same melody, only altering the key. Presumably they are absorbed, since they are produced, but anyone fortunate enough to possess one of them might refrain from spending money on its successors, at any rate for a few years. Moreover, we cannot help feeling that organogenetic development, as it is taught in England to-day, is more consonant with the facts and of more use and value than some of the hoary legends which serve their turns beyond their normal span of life.

Dr. Gideon Dodds's book is in many ways free from these faults. The figures are good and are mostly new and selected for their object. The text is pleasantly written, in good English. The general accounts are clear and adequate, but we would have liked to see more topographical detail in the descriptions of development of organs and regions. It is possible that this may be due to the effort to meet the word "Essentials"; anatomical "essentials" for the neurologist differ from those considered essential by the gynæcologist, and similar relativities hold in the world of descriptive embryology. In any case Gideon Dodds has produced a very readable book, even if the multiplication of the species to which it belongs calls for mild protest.

Applied Anatomy. Eighth edition. By GWILYM G. DAVIS, M.D., late Professor of Orthopædic Surgery and Associate Professor of Applied Anatomy, University of Pennsylvania. Revised by GEORGE P. MULLER, M.D., Professor of Clinical Surgery in the University. London: J. B. Lippincott Company. 1929. Pp. 638. 42*s.*

THIS well-known work, which has been brought out three times since Prof. Davis's lamented death, is now issued again with some slight revision. It is unnecessary to do more than call the attention of readers to this fact, for the book has long passed the stage of criticism and is one of the standard medical works.

RACIAL HYGIENE.

Die Deutschen und ihre Nachbarvölker. Neue Grundlegung der Anthropologie, Rassen-, Völker-, Stammeskunde und Konstitutionslehre nebst Ausführungen zur deutschen Rassenhygiene. By Prof. Dr. WALTHER KRUSE. Leipzig: Georg Thieme. 1929. Pp. xiv.+640. G.M.41.

Prof. Kruse is Director of the Institute of Hygiene of Leipzig University, but in this book he is concerned almost entirely with anthropological and not medical matters. His interest in both subjects dates from more than 40 years ago, when he worked for a time with Rudolf Virchow.

Abrupt opening is made with a criticism of the scales used to match hair and eye colours, and the presentation of new ones which are said to be comparable with the widely used scales of Fischer and Martin. The most important statistics which have been compiled for integumentary colours are then considered. As with the other body characters, the distribution within Germany is first dealt with and then the distribution for Europe as a whole. The frequencies are represented on good maps. Other features discussed in turn are the stature, cephalic index, and several facial measurements, and reference is also made to the available material relating to skulls. The nature of the profile is then considered in detail, as it can be appreciated from living and cranial measurements and qualitative descriptions, such as the grouping of nose-shapes. Composite photographs of the full face and profile views of 28 groups of German men, and of all the groups combined, comprising 800 individuals, are given in Plates III. and IV. and there are some composites for other races in Plate V. These have evidently been prepared with great care, but they are unfortunately reproduced on a very small scale. Body measurements and the blood tests used in recent years, which are claimed to discriminate racial types, are also dealt with.

After treating the living populations thus Prof. Kruse discusses the relationships of extinct races as they are known from a study of their skeletons and principally of their crania. Nearly half of this long book is taken up with the presentation of data such as these, the characters being considered separately and with regard to their geographical distributions. The remainder is concerned with an attempt to reconcile the conclusions which the different kinds of

evidence suggest and with the more general aspects of the subject, such as the variability and correlation of the characters, the way in which they are inherited, and the effects of environment and selection. The association of the various anthropological characters is considered in detail. This is the weakest part of the book, since the author, though acknowledging the need for metrical description, has refused to use modern statistical methods and his treatment by percentages is out of date. The relations of race, mentality, and culture are also dealt with. In conclusion, the presumed racial constitution of German peoples is set forth and something is said of their racial hygiene.

This book may be recommended to anyone who is interested in the main results of the anthropological investigations into the constitution of European races in general, and of the races of Germany in particular, which have been conducted in the past 50 years. It is a conscientious summary of a vast mass of material.

ESSENTIALS OF MEDICAL ELECTRICITY.

Sixth edition. By ELKIN P. CUMBERBATCH, B.M. Oxon., D.M.R.E. Camb., M.R.C.P., Medical Officer in Charge, Electrical Department, St. Bartholomew's Hospital. London: Henry Kimpton. 1929. Pp. 443. 10*s.* 6*d.*

SINCE the publication of the last edition of this well-known text-book eight years ago several important developments have taken place in the art of electrotherapeutics. One of the chief of these is the extension of the use of diathermy, especially in the treatment of disease of the pelvic and genital organs. Dr. Cumberbatch has accordingly entirely rewritten his chapter on diathermy, and has incorporated the methods devised by his colleague Dr. C. A. Robinson. He has also surveyed the uses of diathermy and high-frequency currents in surgery. The revision, as the result of experience, of our early ideas about ionisation has led to an unfortunate neglect of galvanotherapy in general. The author has, however, stressed the value of the direct current apart from its "iontophoretic" properties, which are now recognised to be very limited, and has amplified the sections on iontophoresis without therapeutic ions—or ordinary direct current treatment—and on electro-chemical cauterisation, the other two branches of galvanotherapy. New chapters on the sinusoidal current, and the combination of acupuncture with the galvanic current, have been added. The difficult subject of electrical reactions has been elucidated by several new diagrams; the use of condensers is described, and a section has been inserted on the difficult concepts of chronaxie and rheobase. The whole volume has received detailed revision, and can be commended anew as a thoroughly comprehensive and up-to-date work.

VERNES TEST IN TUBERCULOSIS.

Étude de la réaction de Vernes a la résorcine dans le diagnostic et le pronostic des tuberculoses. By ANDRÉ BRETON, Ancien Interne des Hôpitaux de Lille; Preparateur a l'Institut Pasteur. Paris: Masson et Cie. Pp. 150. Fr.20.

THIS book is a monograph dealing with the application of the Vernes flocculation test for syphilis to the field of tuberculosis. The test consists in the estimation of the amount of flocculation produced when resorcin is added to the serum of a tuberculous patient. This estimation is carried out by means of a Vernes photometer, introduced by the worker whose name it bears, and used extensively in the Institut Prophylactique in Paris. Vernes divides the readings into three zones: (1) negative; (2) intermediate or doubtful; and (3) diagnostically positive. The claim is made that, with the accurate technique of the elaborately constructed photometer, better results can be obtained than with other diagnostic serum tests. This monograph assembles results obtained by various workers, with some case-records, curves, and a bibliography. The complement-fixation test for tuberculosis is also touched upon, but merely to make an unfavourable comparison of its value with that of the Vernes test. No description of the Vernes apparatus is given in the book. In our view the specificity of flocculation with resorcin and tuberculous serum is still unproven, and in any case, the cost of the Vernes apparatus puts it outside the scope of most clinical laboratories. This monograph seems to be an attempt to vindicate the results obtained by the advocates of the test, rather than a working description of the technique, or a critical analysis of the methods.

Corrigendum.—The author of a Manual for Patients Suffering from Diabetes Mellitus, reviewed on p. 84 of our last issue, is Dr. J. Knowles Lund. We regret the inaccuracy.

New Inventions.

PORTABLE OXYGEN INHALING APPARATUS.

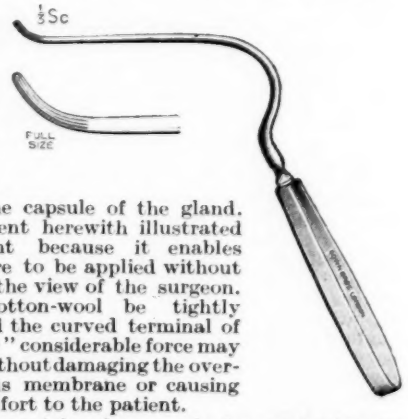
PATIENTS who find relief from oxygen inhalations have complained of the inconvenience of the large oxygen cylinder when they are travelling. In order to meet with this difficulty, Messrs. Allen and Hanburys, Ltd., Wigmore-street, London, W., have made for me a small portable apparatus which is illustrated above.

L. S. T. BURRELL, M.D.

London, W.

A TONSIL PRESSOR.

IT is a common experience to find that a healthy looking tonsil contains septic material in the depths of its crypts and that this can only be made to exude on the surface of the tonsil by pressure on the outer and embedded regions of the capsule of the gland. The instrument herewith illustrated is convenient because it enables such pressure to be applied without obstructing the view of the surgeon. If some cotton-wool be tightly wound round the curved terminal of the "Pressor" considerable force may be exerted without damaging the overlying mucous membrane or causing much discomfort to the patient.



The instrument has been made for me by Messrs. Down Bros., St. Thomas's-street, S.E.

HERBERT TILLEY, F.R.C.S.

THE LANCET.

LONDON: SATURDAY, JANUARY 18, 1930.

CHEST COMPLICATIONS AFTER OPERATION.

DURING the last few years the problem of post-operative pulmonary complications has been approached from many different angles. A great deal of experimental work has been done, and although its results are much what might have been expected, they nevertheless serve to emphasise facts which are apparently obvious and correspondingly often overlooked. For instance, it is hardly surprising to find that a patient's vital capacity is considerably reduced by having a large and recent incision in the abdomen and his lower ribs constricted by a tight binder, but it is important to realise how great this reduction may be, and after which operations it is greatest. Again, few would question the possibility of producing pneumonia by introducing virulent organisms directly into the lungs, yet some observers who realise how difficult it may be to infect dogs in this way would prefer to regard postoperative pulmonary infections as being conveyed to the lungs from the site of operation by way of the blood or lymph stream. The painstaking researches of CHARLTON BRISCOE and others have shown that the physiology of respiration and the normal function of, and balance between, the various respiratory muscles is not so simple as it once seemed.

In spite of all this work it is clear that no great advance has been made in reducing the frequency of these complications, for in our present issue Dr. C. J. FULLER records a series of cases with a higher incidence of complications than any similar series of recent years. His analysis, like others, shows that pulmonary complications most frequently follow operations on the mouth, larynx and pharynx, and those involving an abdominal incision. Other important factors, in his opinion, are preoperative infections of the lung, and toxic complications such as perforation of an ulcer or strangulation of a hernia. The complications fall naturally into two groups—the embolic and the inflammatory. As regards the inflammatory group, it is pretty generally agreed that either a chronic infection is stirred into activity by the anæsthetic or that septic material is inhaled into the lungs during unconsciousness; and it seems reasonable to make inhalation responsible for the prevalence of pneumonia after operations on the mouth and throat. All the same, some observers hold that there is really only one group, and that postoperative pneumonia is caused by irritation or infection of the lungs by a shower of minute emboli arising from the site of operation. FULLER sides with the majority in rejecting this theory. The main arguments against it are, first, that in a very large number of cases no site of origin for the supposed emboli has been found post mortem; secondly, that cases of undoubted infarction run a different clinical course from the majority of postoperative pneumonias and have characteristic features at necropsy; and, thirdly, that it does not account for the prevalence of chest complications in two definite groups of operations and their comparative rarity in others. However distinct the two groups may be in their pathology, there is a growing weight of evidence that they have an important common factor—namely, inertia, and particularly diaphragmatic inertia. Inhibition of the diaphragm by the pain of stretching an abdominal incision, and of the lower ribs by a tight binder, will clearly reduce aeration at the bases of the lungs. If a portion of lung is airless, the secretion cannot be coughed out of it, for the action of a cough is that of a pop-gun, and without air behind it the sputum, like the cork, will remain stationary. It is for this reason that in many case of bronchiectasis posture is the only means of draining away the sputum; it lies at a dead end with no air behind it. If septic material has been inhaled during the unconscious period it will tend to stagnate in the lungs as a whole, because the range of respiratory movement in a patient lying quiet and prostrate in bed will be small; it will be especially small at the bases because, for the reasons given, aeration in this region is specially restricted. Further, the strength of a cough depends on the vigour of contraction of the abdominal muscles, and if these are the site of a more or less painful incision they are not likely to contract briskly; so, even if air is present, coughing will be painful and therefore weak. Inhibition of these muscles also has another effect. The venous circulation from abdomen to thorax is very largely maintained by the production of a negative pressure in the chest, and a simultaneous rise of pressure in the abdomen, by means of diaphragmatic contraction during inspiration. It has been suggested that this mechanism is impaired after abdominal operations, the result being venous stasis and a liability to thrombosis and embolism. In practice two questions have to be answered: how can we best avoid introducing septic material into the lung, or lighting up a latent infection, and how can we best maintain efficient pulmonary ventilation, and particularly diaphragmatic movement, after the operation is over? Attempts to answer the first of these questions include administration of atropin before anæsthesia; routine dental and pulmonary examination before operation; adoption of a special posture or plugging of the fauces in operations on the mouth; and either modification of the standard anæsthetic or postponement of the operation if chronic infection is found. When we come to the second question it must be admitted that few systematic attempts to deal with the problem have been described. It is of interest that FULLER reports the result of an experiment in organised deep breathing, and while it is to be feared that his popularity in the wards was not enhanced, and the result was discouraging for the reasons that he indicates, there can be no doubt that theoretically such respiratory gymnastics are absolutely correct. If abdominal cases (whenever possible) were nursed in Fowler's position, directly they had recovered from the anæsthetic, and made to recline first on one side and then on the other, so that each lung in turn was put in the best position for full expansion, better results might perhaps be obtained. The relatively small incidence of pulmonary complications in lower abdominal cases may be due to their being often nursed in Fowler's position.

There is a third type of pulmonary complication which may follow operation—namely, massive collapse. Here, again, there are two schools of thought, which seem to depend to some extent on whether the observer has been studying post-operative cases or not. Many cases have been reported, particularly during the late war, in which massive collapse followed rapidly on an injury to the abdomen or chest. Some of these injuries were penetrating and others were not, and in some the

collapse occurred on the side opposite that of the injury. Those who have seen such cases suggest that in them the condition is caused by sudden paralysis of the diaphragm, either complete or partial; certainly in many there has been neither clinical nor post-mortem evidence of plugging of bronchi by secretion. Those who base their conclusions only on postoperative cases tend to consider that most if not all are due to blockage of a bronchus with viscid secretion which cannot be coughed up—either because of its consistency, or through weakness of the cough mechanism, or both. Opinion is again divided on whether the collapse is primary and the pneumonia secondary, or vice versa. FULLER considers the latter the most likely. He makes no mention of the treatment of the condition by posture, but the successful results of placing the patient on his sound side and making him cough, or of lowering the level of the head, may be regarded as evidence in favour of what may be termed the "plug of mucus" theory. As in most controversies, a little of the truth probably lies on both sides, some cases being caused in one way, some in the other, and yet others by a combination of the two. A final solution of this problem is not likely to be reached quickly, but if it did nothing more, FULLER'S paper would be useful because it emphasises the very high incidence of chest complications in surgical practice. The need is for a carefully controlled series of experiments in a large number of cases, whereby the effects of varying such factors as posture (both during and after operation), preparation of the patient, type of incision and anæsthetic can be assessed. Probably these complications will never be abolished altogether, but as a result of such an investigation their incidence might well be reduced.

IN MEMORY OF MANSON.

PATRICK MANSON died nearly ten years ago. His name is familiar to the world, but as yet nothing has been done to perpetuate the memory of a great man, a man whose achievements in medical science have added much to the general prosperity of our Empire, while promoting the outlook of health and well-being for the whole world. For he may be said, in face of earlier theories and suppositions having a similar objective, to have been the first to establish the principle of the transmission of disease by insects, and thus to have transformed in large measure, by the recognition of this principle, the chances and opportunities of human life in the tropics. Justly may MANSON be acclaimed, under the title bestowed on him at the International Medical Congress held in London the year preceding the war, as the Father of Modern Tropical Medicine, and justly may it be asked where is the tangible monument to his fame?

MANSON'S career makes an inspiring story of unremitting industry. At the age of 22, in 1866, as a Scottish medical graduate, he went to Formosa to act as medical officer to a group of merchants and missionaries. He found himself immediately in a pathological environment the expressions of which were entirely unknown to him and the ætiology of which was for the most part unknown equally to the medical profession on the spot and to scientific workers and academic teachers all the world over. His studies in Formosa were soon interrupted, but at Amoy, in China, where he transferred himself in 1871, to act as medical officer to the Chinese Maritime Customs, he settled down to work methodically at the treatment of tropical diseases. Here he distinguished filaria in blood, being unaware that this had been done already, when a return to England gave him the opportunity of reading the existing literature of elephantiasis. Being, in 1876, again at Amoy, he spent two years in working out the life-history of filaria, the results of which were published through the intervention of T. S. COBBOLD, the famous helminthologist, in 1879. But MANSON was now working assiduously and recording experiments, with hourly records of temperature, among his native patients in the search for the parasite of malaria, and in a letter which he wrote to COBBOLD, and which is quoted in the obituary notice in our columns, he alludes to the embarrassment under which such investigators as himself were placed, "crippled as we are with the necessity of making our daily bread." But it is doubtful if MANSON would have succeeded in realising any of his ideals had he not possessed the range of practical knowledge and adaptability which he acquired as a healer of the sick. For ten years, with short intervals in England (during one of which he worked for the first time with an oil immersion lens) he remained in China, much of the time in Hong-Kong, and carried on a general practice while pursuing the researches whose grand message was now becoming clear. He confirmed his work on filariasis with the better apparatus at his disposal, made original researches into sprue, and kept the results of his unintermittent industry in careful records. When he returned to England in 1890 he did so with an unrivalled personal knowledge of the inflictions of tropical disease, and a determination to attempt the placing of tropical hygiene upon a scientific basis from which organised attempts could be made to counteract their terrors. He became physician to the Seamen's Hospital, was appointed lecturer on tropical diseases in the medical school of St. George's Hospital, and in 1897 medical officer to the Colonial Office. Here his work came to the notice of JOSEPH CHAMBERLAIN, that prince of Colonial Ministers, and here the well-known story of the dissemination of malaria commences, as far as its public recording is concerned. MANSON'S work upon elephantiasis pointed to a physiological and mechanical connexion between an immature organism and the presence of a mature worm in the blood. He saw that an intervening agent and one that was capable of piercing the skin of the human body and of absorbing the human blood thus infected was necessary, and the possible rôle of the mosquito had occurred to him. The tremendous analogy was suggested by experiments already undertaken before his return to England, but for private circumstances it was impossible for him to return to tropical districts and pursue his investigations. It was then that the splendid coöperation with RONALD ROSS took place, for ROSS agreed to carry on MANSON'S researches in India, and everyone knows the grand result. The work was confirmed by personal experiment in the most malarious parts of Italy by Dr. G. C. LOW and Dr. LOUIS SAMBON, and later, in London, by MANSON'S son, the late Dr. THURBURN MANSON, and to-day the world is reaping immeasurable benefits therefrom, benefits which must grow by geometrical progression as the years go by.

An appeal will be issued shortly for subscriptions to provide a material memorial to MANSON and his work. The memorial is to take the form of a permanent home for the Society of Tropical Medicine and Hygiene, in the foundation of which MANSON was one of the pioneers, as he was the first president. The movement requires no advocacy from us; its reasons we have just summarised, with the knowledge that to our readers every word would be familiar. The invitation to honour MANSON should find ample

response from all classes, while practical force is added to it by the generosity of the Fellows of the Society, who are not wealthy individually or as a corporation. Towards the object of the appeal the Fellows of the Society themselves have subscribed £6000; the £20,000 still needed should certainly be found promptly outside their circle, especially as the public has an incalculable debt to pay to MANSON'S memory.

THE PUBLIC DENTIST.

RESORT to the dentist is less of a habit in this country than it is, for example, in America, and large numbers of our people to whom dental hygiene is more or less of a novelty are prone to lapse when the pressure of propaganda slackens and temporary immunity from pain or discomfort has been obtained. In spite of the offer of dental treatment as additional benefit under the Insurance Acts to increasing numbers of insured persons during the last seven years, the demand for such treatment, even under the stimulus of novelty and of substantial grants towards the cost, has never exceeded 15 per cent. of those eligible and is now gradually sinking. The report of the Departmental Committee on the evils associated with unqualified practice of dentistry, issued in 1919, resulted in the passing of the Dentists Act of 1921, but the recommendations which it contained for the provision of adequate dental treatment to certain classes of the community have remained a dead letter. It is with the object of bringing into prominence those aspects of public dental service that the British Dental Association has revised and re-issued a report on Dental Treatment and National Health which first appeared in 1920.

The main features of this amended report are summarised on p. 155 of our present issue. It regards the organisation of dental treatment for expectant and nursing mothers, for the pre-school child, for the child of school age, for the adolescent, for adults under the National Health Insurance Act, and for adults outside the scope of that Act who are unable to afford the fees of the private dental practitioner—all this as in the nature of a public responsibility; such dental treatment as is necessary as an adjunct to the effective treatment of tuberculosis and of venereal disease is put in the same category. Finally, the report presses for a coördinated scheme of education in oral hygiene for the young with the object of preventing dental disease. Each of these requirements is dealt with in detail in separate sections of the report, and the result is a document worthy of the attention of the Ministry of Health and of local authorities and of all persons interested in the health of the nation. It may be noted that the tendency of dental opinion, as voiced by its professional association, is not only towards extension of public administration but also towards extension of the employment of the public dental officer. With the exception of the insured adult, and possibly of the adolescent, it appears to be conceded that public dental service should be relegated in an increasing degree to the whole-time dental officer. It has been long recognised as undesirable for the dental treatment of elementary school-children provided by local education authorities to be given in the private consulting rooms of dentists, and the same applies with certain exceptions to dental treatment given on a comprehensive basis to school-children. Even in the case of the insured adult there seems to be a leaning in the report towards the limited use of the treatment centre, although as in the case of medical benefit it is desirable for the freedom to obtain treatment from the private dental practitioner (as provided in the National Health Insurance Act, 1928) to be claimed by the great majority. One gratifying fact is clearly brought out in the report. The framework of a complete dental service is already in existence and what is now required is to fill up certain gaps and to complete the service in accordance with the need for it. There are comparatively few local education authorities which have made no provision for dental treatment, but it is estimated that at present there is only an average of one school dentist to every 11,000 elementary school-children, whereas the number necessary to provide adequate attention is, at the lowest, one dentist to every 5000 children. Moreover, the number of maternity and child welfare centres where dental treatment is provided is regrettably small. There is one class mentioned in the report for which no provision has been made—namely, the adolescent—who on leaving school has lost his access to the school dental clinic and is not yet eligible for additional benefit, an age-group, be it remembered, in which the incidence of dental disease is high. The Association would do well to work out a scheme by which treatment could be provided for this class and what it would cost.

Finally, the British Dental Association calls attention to an administrative measure for which the time is held to be ripe—namely, the provision of some central dental control. In the Navy and Army dental officers of appropriate rank are responsible, under the director-general of the respective medical services, for the administration of the Royal Naval Dental Service and the Army Dental Corps. The claim that the time has now come for a similar appointment at the Ministry of Health under its chief medical officer appears to be a reasonable one.

BRITISH EMPIRE CANCER CAMPAIGN.—Lord Reading presided at the quarterly meeting of the Grand Council of the Campaign on Monday last. The Council confirmed the action of the Scientific Advisory Committee and the Finance Committee in approving that Dr. Thomas Lumsden, who has been carrying out immunisation work at the Lister Institute, shall in future carry on his work in the laboratories of the London Hospital, to which he has been formally appointed Honorary Director of Cancer Research. The Campaign will continue to make its financial grant direct to Dr. Lumsden for the purposes of the continuance of his work. The Council confirmed the recommendation of the Executive Committee that the request for affiliation to the Campaign by the Manchester and District Radium Institute should be acceded to. Sir Charles Martin, Director of the Lister Institute, was elected a member of the Grand Council, at the request of the Queensland Branch of the Campaign as its representative. It was reported that in accordance with the invitation of the National Radium Commission, an informal conference was held between representatives of that body, the Medical Research Council, King Edward's Hospital Fund, and this Campaign, on the general subject of radium. The Campaign had been represented by the two Vice-Chairmen of the Grand Council, Lord Dawson of Penn and Sir John Bland-Sutton, and by the Chairman of the Executive Committee, Mr. J. P. Lockhart-Mummery. It was stated that similar conferences would be resumed at an early date with a view to the Campaign assisting in every way the coördination of the radium supplies of the country. At the informal conference the General Secretary of the Campaign reported that it appeared that when the present supplies of radium ordered by the Radium Commission were available, together with the 4-gramme bomb now at the Westminster Hospital, as well as orders placed by private institutions, the total amount of radium available in England, Scotland, and Wales would approximate 60 grammes. It is contemplated that this amount will be still further increased when the final orders are placed by the National Radium Commission and the various branches of the British Empire Cancer Campaign. The Secretary reported that formal approval had now been given for the transference of the offices of the Campaign to 12, Grosvenor-crescent, Hyde Park Corner. In the new building the Campaign will be the tenants of the Joint Council of St. John and the Red Cross. It is hoped that the removal will take place immediately after the Easter recess.

Annotations.

"Ne quid nimis."

VEGETARIANISM.

THE precise evaluation of vegetarianism as a régime for mankind can be accomplished only be observations on the human species, although other animals may be very usefully employed to indicate particular aspects of the problem that may be worth investigating among men. The omnivorous rat obviously lends itself well to experiments of this kind, and interesting observations on this species have been recently carried out in Pekin.[1] The basis of the vegetarian diets given to these animals were cereals and legumes, which supplied ample energy value and protein, and leafy vegetables were added as a supplement to provide mineral elements and vitamins. The growth of young animals on these diets depended largely on the choice of vegetable. Spinach as a supplement produced a slow rate of growth and allowed severe rickets to develop, but a leafy vegetable known as "small cabbage" caused a normal rate of growth and prevented the appearance of rickets. It was therefore proved that a purely vegetarian diet could be devised which was adequate for the normal growth of the young rat. Moreover, these young rats were just as fertile as those fed on the control diet, which included milk. The progeny of the vegetarian rats, however, when themselves given the same type of food, grew at a slower rate than normal, and did not attain the same weight as the controls. The second and third generation reared on the vegetarian diets attained a maximum weight of only 400 g., compared with a maximum of 500 g. reached by those on the control diet; they also showed less resistance to infection, though their average span of life did not seem to differ from that of the controls. The broad result of the experiments was a demonstration that omnivorous animals may be kept for several generations on a vegetarian diet without any sign of abnormality other than a lowered standard of physical development. The question then arises, are these results applicable to man? Numerous experiments have been conducted with individuals or small groups of men in an attempt to appraise the effect of vegetarian diets on physical and mental capacity. Many of the observations are of little value, for the diets used included milk and butter, and though "fleshless" were not strictly vegetarian. There is little doubt that health can be maintained in a normal adult on a diet derived wholly from the vegetable kingdom, but there is no evidence that such a diet is better than the mixed diet employed by most races of mankind. Man's alimentary tract is not designed like that of the herbivores for dealing with large quantities of vegetable foods. He can get over the difficulty by employing his agricultural experience to produce in large quantities concentrated foods such as cereals, legumes, and nuts. But these foods are relatively deficient in important factors such as vitamins and mineral salts, especially calcium. A supplement of fresh green vegetables and fruit will help to supply the missing factors, as has been demonstrated by animal experiments. It appears, however, more reasonable to allow the herbivorous animal to concentrate for us, by means of its specially constructed gut, the valuable food factors that it can extract from plant food, and to consume them ourselves in the form of dairy produce, even if for æsthetic reasons we do not slaughter them for their flesh. It is interesting to speculate on the relation between vegetarianism and the racial characters of mankind. The Eastern races subsist largely on a vegetable diet composed of cereals, and certainly the Chinese and Japanese have a lower general standard of physique than the Western races. It is extremely difficult to decide whether heredity is entirely responsible for the short stature of the Chinese, but certainly many individuals exist who are well above the average Western standard. It has been shown in this country that milk has an astonishing power of promoting growth in children, and it seems possible that the very small consumption of milk and other animal products in China may be responsible, at least in part, for the lower standard of physical development met with there. It may be difficult to find any scientific reason why mankind should regularly include animal flesh in his diet, but so far as our present evidence goes, strict vegetarianism is not the régime best suited for the nutrition of mankind, and those who abstain from meat are well advised to make plentiful use of dairy produce to supplement their vegetable food.

[1] Hsien, Wu: Jour. Oriental Med., 1929, xi., 68 and 114.

PROBLEMS OF PYLORIC OBSTRUCTION IN INFANTS.

THE diagnosis of congenital hypertrophic pyloric stenosis is made nowadays with greater ease and frequency than ever before, and the Rammstedt operation, especially if carried out under local anæsthesia, may be regarded as extremely successful when the age of the patients and the former mortality-rates are considered. At the same time the difficulties both in establishing a diagnosis and in deciding upon the correct line of treatment cannot be ignored. In a recent paper[1] Dr. N. M. Frischmann, of Moscow, discusses these difficulties and seeks to lay down certain guiding principles. All will agree that an infant who in the first few weeks of life suddenly begins to vomit should be suspected of pyloric obstruction, especially if he is constipated. The presence of visible gastric peristalsis, a thickened pyloric tumour combined with a stationary or falling weight curve, ought to establish a diagnosis of pyloric stenosis. In most cases no doubt arises; supposing, however, that the child's general condition is fairly satisfactory, that gastric peristalsis though definite is feeble, and that there is some doubt about the pyloric tumour, then the question of pyloric spasm crops up. Dr. Frischmann takes the view that cases of pyloric spasm are not uncommon, occurring particularly in a neuropathic stock, but he also points out that possibly pure spasm cases and pure stenosis with muscular hypertrophy are really much rarer than varying combinations of the two conditions. In other words, congenital hypertrophic pyloric stenosis may frequently have an added spasmodic element, while patients suffering from spasm may develop some thickening of the pyloric end of the stomach which can be felt through the abdominal wall when it is in a spastic condition. Many authorities, especially in Germany, fail to differentiate between the two conditions, and Finkelstein, for example, classifies pyloric spasm and stenosis under one heading. In this country, on the other hand, where possibly cases of pyloric spasm are rarer than elsewhere, the presence of a palpable pyloric tumour would be held as positive evidence of congenital pyloric stenosis; but a girl baby of, say, 5 or 6 months with vague peristalsis in the epigastrium and no pyloric tumour is regarded as an example of spasm. While the presence or absence of a tumour usually gives the key to the diagnosis among experts help can sometimes be gained by radiological examination after an opaque meal, a means of diagnosis which Dr. Frischmann does not discuss. In connexion with treatment he holds that the general condition of the child should be the chief consideration, and echoes what is now the teaching in the chief children's hospitals in this country—namely, that an infant with pyloric stenosis is never too ill for Rammstedt's operation, but he may be too well for it. It is the almost moribund, emaciated infant of a few weeks who makes the most spectacular recovery, while the comparatively well-nourished older child may do badly after operation. It is, of course, well recognised that the condition of pyloric stenosis seems to right itself spontaneously after about the fourth or fifth month of life, and if the

[1] Jahrb. f. Kinderh., 1929, cxxvi., 95.

patient is approaching this age medical treatment by stomach washouts, atropine, and thickened feeds will often carry him over the interval. In private practice this form of treatment is often completely satisfactory for younger babies with pyloric stenosis, but in hospital work intercurrent diarrhœa presents too great a risk for an infant who may have three months to run before his stomach starts functioning normally. In Germany great success is claimed for medical treatment for most cases of pyloric stenosis. Dr. Frischmann's paper suggests that this may be due to the inclusive cases of pyloric spasm under the same diagnosis: but possibly different hospital conditions with separate cubicles and unlimited nurses may also be a factor. In Russia the Rammstedt operation is regarded as a valuable therapeutic procedure in selected cases, and local anæsthesia seems to be generally preferred.

HIGH SPINAL ANÆSTHESIA.

UNLESS some recent experiments and clinical observations[1] made at the Crown Heights Hospital, Brooklyn, are proved incorrect, certain widely held ideas with regard to spinal anæsthesia will have to be abandoned. Moreover, if Dr. Koster and Dr. Kasman are right, and their experiences are truly recorded, the applications of spinal anæsthesia are likely to be much extended. For during the past 18 months these two surgeons have employed spinal anæsthesia as a routine for all operations, except very short ones, whether on the trunk, head, neck, thorax, or upper limbs. In 150 cases they have met with no serious respiratory or cardiac embarrassment. They aver that the fear of paralysing the respiratory centre by allowing a local anæsthetic to reach the medulla is unfounded, and that in point of fact they purposely allow the anæsthetic to affect the sensory roots of the upper portion of the spinal cord as well as the bulb. They have founded their practice on the idea, which they claim to have proved true by experiment, that the anæsthetic agent has a selective affinity for sensory nerve tissue. Experimentally they have applied directly to the exposed bulb of the frog and of the guinea-pig anæsthetic solutions far stronger than those used on humans, and have shown that although complete insensibility was obtained, yet there was no respiratory depression. They argue that if paralysis of respiration results from the diffusion of the drug from the lower portion of the spinal subarachnoid space to the medulla, the same effect should be produced more readily, more easily, and more quickly by the direct application of the anæsthetic agent to the medulla itself. And this application produces no paralysis. By another set of experiments they show the paralysis of sensory fibres in a nerve, while motor fibres were unaffected, and they quote the finding of Santeson that direct contact of 5 per cent. cocaine hydrochloride broke sensory conduction so completely, that the strongest tetanic stimulation peripheral to the anæsthetised area was no longer able to produce a response, while the same concentration of anæsthetic left motor constriction unchanged for about one hour. In the opinion of Koster and Kasman, this selective affinity for sensory nerve-fibres is a quality of all the cocaine series of anæsthetics. It is to be remembered in this connexion that with general anæsthetics, too, the motor mechanism of the central nervous system is more resistant than the sensory. The authors contend that the respiratory centre is a station for the initiation of motor impulses, and possesses inherent properties that render it immune to the effects of an anæsthetic in the concentration advocated for spinal anæsthesia. According to them not only does it not matter that the anæsthetic reaches the bulb, but also the means devised, by light and heavy solutions and table-tilting, to prevent this happening are ineffective. The anæsthetic agent is rigidly fixed by the lipoid reaction. Lipoid tissues have an affinity for anæsthetics, and unite with them with considerable avidity, and therefore it is hard to understand how solutions, whatever their specific gravity, can be made to diffuse either upward or downward, some time after the fluid has come into contact with the nerve tissue. Another ground on which they explain the fact that complete anæsthesia of the entire body is possible without respiratory or cardiac failure, relates to the phenomenon of conductivity and excitability of nerve tissues. Sensory impulses, they maintain, en route to the cerebrum may be stopped in the medulla because *conductivity* is interrupted whereas the cardiac and respiratory centres to the medulla, although their *excitability* is lowered, can still initiate motor impulses in response to the physico-chemical stimuli furnished by the blood. The authors determine the height of the anæsthesia obtained by the amount of cerebro-spinal fluid withdrawn and reinjected with the anæsthetic. They regard the fall of blood pressure often witnessed as free from danger so long as the Trendelenburg position is maintained. When respiratory failure does occur with spinal anæsthesia, they attribute it to the insufficient supply of blood to the brain consequent on a large amount of vaso-constrictor paralysis, not to any paralysing effect of the anæsthetic on the centre. And a certain preventive of fatal effect from vaso-constrictor paralysis is to keep the patient in the Trendelenburg position. There is, as the writers point out, nothing new in employing spinal anæsthesia for high regions of the body, and Lefiliatre and Jonnesco, as well as others, have used the method for years. What is, however, new is the explanation of its safety, and the contradiction of the theories on which it was condemned, also the experimental work to support the arguments put forward. It is interesting to observe, in the critical article by Dr. E. Falkner Hill which appears on another page, strong testimony to the truth of Koster and Kasman's chief contentions, especially those concerning the blood pressure during spinal anæsthesia. This testimony having been arrived at on purely independent and clinical grounds is the more valuable.

[1] Spinal Anæsthesia for the Head, Neck, and Throat: its Relation to Respiratory Paralysis. By Harry Koster and Louis P. Kasman, Surg., Gyn., and Obst., 1929, xlix., 617.

THE FIRST ASYLUMS RESEARCH LABORATORY.

IN our issue of Dec. 14th an Edinburgh correspondent stated that Scotland was a pioneer in offering a solution of the problem of laboratory work in the smaller mental institutions. We are indebted to Dr. Douglas McRae, editor of the *Journal of Mental Science*, for particulars of this pioneer effort which antedated the formation of the Scottish Western Asylums Research Institute by more than a decade. Thirty-three years ago the *Journal* recorded the presentation by Dr. T. S. Clouston of the report of a committee which had met to discuss the appointment of a conjoint research pathologist. The committee had circulated a statement setting forth the value of the pathological study of insanity, and had succeeded in convincing enough boards of asylums to guarantee the sum of £600 for five years. By January, 1898, the laboratory was ready for work. The Royal College of Physicians had opened a large laboratory in Edinburgh and the asylums had secured two rooms in immediate contact with this. Dr. Ford Robertson was appointed pathologist, and Dr. David Orr his assistant, and their duties were defined as follows: "To carry on original researches upon the pathology of insanity; to examine pathological material sent from the asylums and to furnish reports; to teach and give assistance to members of the medical staff of the associated asylums in regard to research work upon the pathology of insanity; to make one visit annually to the associated asylums at the expense of the laboratory funds, and to make additional visits as required." Fourteen institutions had already united to set this scheme on a sound

[1] Journal of Mental Science, 1897, lxxiii., 640.

financial basis, and it was hoped that the pathological laboratory would "keep alive that glow of intellectual vitality which medical education inspires, and constitute a centre to irradiate the remoter hospitals for the insane in Scotland."

The thirty-second annual report of the Asylums Research Laboratory for 1928 shows that the objects of the founders of this scheme are being fulfilled. In addition to routine investigations and visits, the pathologist, Dr. F. E. Reynolds, together with Dr. Logan Turner, has published a number of papers on research, and has made progress with his scheme of establishing a centre of neurology in Edinburgh University. Among the lecturers at the 1928 annual course on neuropathology was the first assistant pathologist, Dr. David Orr.

VAGINAL EXAMINATION IN THE THIRD STAGE OF LABOUR.

IF there is one guiding principle in midwifery that has been generally accepted, it is the strict limitation of all internal examination and manipulation because of the risk of carrying infection from the surface of the body into the genital canal. The anal, perineal and vulval areas cannot be made germ-free, and the tendency in modern obstetric practice has been towards the improvement and development of methods of external examination and manipulation in order to obviate the risk of passing through a germ-bearing area. Hospital statistics prove the reality of these dangers, for morbidity increases with interference and grows greater as this interference extends upwards, reaching a maximum after manual removal of the placenta. Hence any suggestion to increase internal intervention must be very clearly investigated to find whether its advantages to the patient will outweigh its undoubted disadvantages. This applies emphatically to Dr. Morris Leff's[1] advocacy of vaginal examination after the fœtus is born in order to discover if the placenta has separated. His paper is based on a series of 1000 consecutive cases, and contains some useful contributions to our knowledge of the phenomena of the third stage of labour. He rejects the view that retroplacental hæmatoma plays an effective part in the separation and considers that this process follows more promptly on the birth of the fœtus than has been thought. But even if these physiological observations are accepted as accurate, the onus of proof for a change in our management of the third stage of labour lies with the author, and the case will be decided by the justification he can offer for vaginal examinations in the uncomplicated third stage. In almost 90 per cent. of the 1000 cases the placenta was delivered within five minutes of the fœtus, and in all but 24 cases within ten minutes. Manual removal was practised in two cases. The average duration of the third stage in the 1000 cases was 4·3 minutes. There is, therefore, no question that this practice may lead to a considerable shortening of the time of the third stage. That alone could scarcely justify Leff's claims; further reasons are given in a considerable reduction in loss of blood and, in consequence, of morbidity, and that the patient recuperates sooner. For these statements, however, no evidence is offered beyond that of a diagram showing the placenta obstructing the cervix, blood accumulating behind it, and no sign of bleeding externally; 267 cases showed bleeding before delivery of the placenta, while 733 gave no evidence of bleeding, from which it seems to be taken for granted that this blockage by the placenta, as shown in the diagram, occurred in nearly three-quarters of his cases. There is also a table giving the estimated loss before and after delivery; in 712 cases it was said to be slight (under 6 oz.); in 243 moderate (between 6 and 12 oz); in 41 considerable (up to 20 oz.); and in 4 profuse (over 20 oz.). There are no morbidity records, and no clear proof that the finger passed into the cervical canal can accurately determine all the points which Leff mentions, such as "where the placenta is located after separation," a knowledge of which he regards as essential to a proper technique in expression. He may have had success with his method, but before recommending it for general adoption he must show that his cases have at least no greater morbidity than those under the method hitherto found satisfactory. This gap deprives his contribution of much of the practical value it might otherwise have had

[1] Amer. Jour. Obst. and Gyn., December, 1929, p. 868.

THE UNITY OF STREPTOCOCCAL TOXINS.

IN the early days of streptococcal history—and so quickly has knowledge increased that one is apt to forget that its history began in the 'eighties—there was a tendency to believe that organisms recovered from different lesions in the body were each specific and distinct bacteria. The widespread nature of streptococcal infection threw doubt on this theory, and the swing of the pendulum led to the theory, still prevalent in France, that there was only one streptococcus. To-day opinion is half-way between these extremes. The animal streptococci, the fæcal streptococci, are held to be distinct strains. The hæmolytic strains differ from the non-hæmolytic, and the former are the more virulent organisms, though mutation from one form to the other occurs. But within the group of hæmolytic organisms are three well-known types associated with scarlet fever, erysipelas, and puerperal sepsis. It is urgently necessary to discover whether these are identical or separate, both from the point of view of the ætiology and prevention of the conditions, and of their serum therapy. The method by which serums are prepared may be all-important. The old type of serum employed for treatment of streptococcal infections was known as polyvalent antistreptococcal serum. It was made by injecting horses with suspensions of streptococci, and, therefore, was mainly an anti-*bacterial* serum; although some specimens may have chanced to contain a certain amount of anti*toxin* no attempt was made to induce the formation of it. On the other hand, the antiserum referred to in Dr. A. B. Rosher's article (see p. 129) is essentially antitoxin, prepared by the immunisation of horses with *toxin* produced by the scarlet fever streptococcus. In the preparation of this serum cultures of streptococcus are injected into the horses as well as toxins, so that it should have antibacterial properties as well as antitoxin ones. The problem is not easy to approach. Agglutination and cultural tests are indefinite, and perhaps inadequate, for the main question to be solved is that of the specific or non-specific toxin production of different strains. And the method mainly employed has been the skin-test technique of G. F. and G. H. Dick, although a few results with rabbits, and a recent paper in this journal by H. Burt-White,[1] on therapeutic effects of scarlet fever serum on puerperal sepsis have been recorded. Results are remarkably discordant. D. G. S. McLachlan[2] found erysipelas toxin to be neutralised by scarlet fever antitoxin. H. Burt-White found puerperal fever to be beneficially treated by scarlet fever antitoxin. G. F. and G. H. Dick,[3] however, recently published an elaborate analysis of the mutual action of erysipelas and scarlet fever toxins and antitoxins. They found no neutralising power whatever of non-homologous sera; moreover, individuals were frequently found immune to the one toxin, while sensitive to the other. Similar results have been obtained by other observers using strains isolated from the throats of rheumatic children. In all these cases human skin tests were used. Among other authorities who found results opposite to those of G. F. and G. H. Dick, are C. C. Okell and H. J. Parish,[4] who could find no distinction

[1] Burt-White, H.: THE LANCET, Jan. 4th, p. 16.
[2] McLachlan, D. G. S.: Jour. Hyg., 1927, xxvi., 84.
[3] Dick, G. F., and Dick, G. H.: Jour. Amer. Med. Assoc., 1929, xciii., p. 1784.
[4] Okell, C. C., and Parish, H. J.: THE LANCET, 1927, ., 71.

between any streptococcal toxins. Dr. Rosher, in the paper already referred to, has obtained remarkably successful results in four patients with septicæmia, blood cultures being positive in all cases. The identity of skin reaction with toxin is by no means proven. Since it is now established that concentrated toxin will kill laboratory animals, it would appear reasonable to use that method in differentiating the toxins. Our only specific means of dealing with streptococcal infection at present is with antitoxins. Their effect on animals is dramatic, in the neutralisation of toxin, and the prevention of death, or at any rate its prolonged delay, in infection with living organisms. If there is more than one toxin, we must look to serological laboratories for the appropriate antisera. And, since the only hope of any serum therapy lies in its earliest possible use, some rapid and certain method of recognising strains becomes essential. Meanwhile the practitioner who receives a report that a hæmolytic streptococcus has been recovered from the blood of a patient suffering from septicæmia will be wise if he injects scarlet fever streptococcal antitoxin in preference to antibacterial serum.

THE ÆTIOLOGY OF ERYTHEMA MULTIFORME.

Erythema multiforme (Hebra) takes a prominent place among the dermatoses which most authorities in England and America have accepted as examples of the effect of fœcal sepsis. The work of Rosenow on the variable toxicity of streptococci, and the clinical observations of Leslie Roberts and H. W. Barber in this country, have gone far towards establishing this hypothesis, but in practice it is found that extirpation of accessible septic foci is by no means always successful in preventing recurrences of the clinical manifestations, even when autogenous vaccines are associated in the treatment. A paper [1] just published by Prof. Edwin Ramel, of Lausanne, is of great interest in this connexion. He admits many of the contentions of those who argue in favour of a streptococcal ætiology; thus he agrees that sore-throat often precedes the eruption and that hæmolytic streptococci can sometimes be recovered from the lesions. But he quotes cases in which these organisms were not found, and claims that if erythema multiforme has a streptococcal cause the organisms should always be present in the skin, for they are always recoverable in the true streptococcides. The argument is not altogether sound, for there are undoubted cutaneous manifestations of syphilis and tubercle in which all efforts to find the virus in the skin have been fruitless. The phenomena of skin sensitisation are highly complex, however, and Ramel cannot accept a theory of special streptococcal susceptibility of the skin in erythema multiforme on the evidence at present available. He has attacked the problem—which in its salient features much resembles that of lupus erythematosus—in another way. Being convinced of the tuberculous origin of lupus erythematosus he was led to suspect a similar ætiology for erythema multiforme, and in four cases—previously unpublished—he claims to have demonstrated a "tuberculous bacillæmia at the period of eruption." His technique is briefly as follows. About 5 c.cm. of the patient's blood were injected into the subcutaneous tissues in the region of the left groin of two guinea-pigs. These animals seemed to show no signs of ill-health for three months after the inoculations, but necropsy then revealed a little enlargement of the local lymph-glands and some greyish gelatinous nodules in the lungs. A tissue extract from them was made into a second series of guinea-pigs, with a somewhat similar result after two and a half months. Yet a third series was then subjected to the same experiment, and in these the clinical evidence of tuberculosis was very strong, and the suspicion was amply confirmed by the microscopical demonstration of acid-fast bacilli in smears of tissue fluids from the various organs. A similar result was obtained in all four cases of the disease. In his commentary Prof. Ramel is careful to anticipate various criticisms to which his observations will give rise. The findings, he says, were unexpected even by himself, and he agrees that patients with erythema multiforme rarely, if ever, manifest any clinical signs of tuberculosis. The question of the validity of the method of successive inoculations and the possibility of "spontaneous" tuberculosis in his stock are discussed and balanced against the remarkable concordance of results in the four cases. It is claimed for tubercle that it explains the symmetrical distribution of the eruption, the occasional occurrence of fatal cases, and the sudden onset, sometimes after additional factors have been brought into play—such as erythema solare or an illness or septic condition. His theory would allocate to the streptococci the rôle of "agents provocateurs," rather than "origines malorum," and from the dermatological standpoint it is, to say the least of it, disconcerting. If confirmed it would profoundly modify current views on the ætiology of this dermatosis, and also (as the author himself observes) the present conceptions of the general pathology of tuberculosis.

[1] Brit. Jour. Derm. and Syph., January, 1930, p. 1.

REMOTE PROGNOSIS OF PNEUMONIA.

FOR many years it has been recognised that children who have had a long respiratory infection are extremely liable to develop pulmonary fibrosis and bronchiectasis, with distressing symptoms. This fact led Dr. H. P. Jameson [1] to investigate the after-history of children who had had pneumonia in the Hospital for Sick Children, Great Ormond-street, London, and in the Children's Hospital, Birmingham. Fifty-eight children whose illness had lasted more than three weeks were re-examined after a considerable interval, and of these 18 were found to be suffering from symptoms severe enough to make them lead a life of semi-invalidism. Those who had rickets as a complication at the time of their infection did worst, whereas even out of those 23 who had what the author calls an acute non-specific pneumonia (as opposed to one following measles or whooping-cough) four, or 17 per cent., had severe symptoms of pulmonary catarrh. This statistical study, small as it is, emphasises the problem with which the physician is frequently faced in an out-patient department. A child may be discharged from a ward having made an apparently satisfactory recovery from a prolonged bout of pneumonia, or may even return from a month's convalescence in the country, only to be found suffering from incipient bronchiectasis or a second attack of pneumonia. Dr. Jameson's experience should lead to a more serious consideration of these cases; strong efforts should be made to prevent the development of sequelæ, since the patients are likely to reach a stage of danger not only to themselves but to the other members of the families to which they belong. It is not improbable that if they were examined regularly in follow-up clinics that the proportion of children whose lungs are permanently damaged might be found even greater than that recorded by Dr. Jameson. An attempt should be made to reduce it by earlier recognition and treatment. It has long been a matter of regret that no sanatoriums are provided for chronic non-tuberculous cases, since much can be done by open-air treatment to minimise the damage done to the lung. These children benefit greatly by a visit to the country, and this benefit is often of long duration. Radiographic evidence supports the belief that the fibrous changes when present can be arrested. Unfortunately it is usually impossible for children of the hospital class to spend much time in the country. If their stay has to be limited, it is desirable that the winter rather than the summer months should be chosen for life in the country. As regards other treatment, ultra-violet ray therapy can be tried, and vaccines help to clear up the lung in a small proportion of cases. Almost

[1] Jameson, H. P.: Archives of Diseases in Childhood, December, 1929, vol. iv., p. 365.

without exception the adventitious sounds are heard at the bases of the lungs in these post-pneumonic patients. This in itself suggests mechanical treatment for their relief, and although it is early to judge fully of massage, it appears to assist in promoting convalescence. Many of our hospitals are trying out this comparatively recent innovation; Dr. Douthwaite and Miss Angore have given pulmonary diseases a prominent position among the indications for treatment by massage and gymnastics discussed in a recent paper.[2] They stress the importance of the expiratory part of respiration, and although they desire a large expansion they do not wish to gain it at the expense of the alveolar walls with risk of emphysema. It is essential to carry out exercises in such a posture that the patient has the assistance of gravity in helping him to expectorate the pent-up sputum. It is surprising with what speed youngsters will learn these exercises, and with what enthusiasm, according to their mothers, they will do them in their own homes. It is by these measures rather than by medicine that we can hope to prevent recurrences, which, as Dr. Jameson has shown, increase the chances of severe sequelæ to 50 per cent. There seems to be no definite criterion as yet whereby we may discover which among the non-pleurogenous patients is going to develop symptoms, and therefore it is wise to treat them all as potential cases of pulmonary fibrosis.

ALCOHOL AS AN ECONOMIC FACTOR.

Sir Josiah Stamp's lecture[3] to the Society for the Study of Inebriety will certainly do something to discourage facile statements on the economics of alcoholism. Most of us have lived too long to need his advice to be chary of believing all we are told about prohibition in America, but it is easy also to be misled by statistics from nearer home. For instance, one of the arguments against the brewing trade is that it finds employment for very few workers in comparison with the money it receives from the public. Sir Josiah quotes a plausible series of figures published by a temperance journal to prove this point, but remarks that they ignore those persons employed in distribution, in producing current materials, and in manufacture of articles necessary for repair and maintenance of the plant. Their inclusion, he says, would raise the numbers approximately to the standard given for other trades. Further, one has to consider the revenue obtained from the drink duty, which is used for the employment of persons in Government service. And the fact must be faced that under prohibition the loss of revenue to the country from this source would have to be supplied by increased general taxation.

Although it is extremely difficult, as Sir Josiah Stamp says, to arrange any experiment which will demonstrate the effects of removal of alcohol upon workers, uninfluenced by other factors, a large number of observations made under varying conditions must carry a certain amount of weight if their results tend to agree. To give an example from the United States, Prof. Feldman's questionaire on Monday and after-pay-day absenteeism produced, out of 287 replies, 184 reporting considerable improvement since the introduction of prohibition. Of these 184, 88 gave most of the credit to the Act, and 40 gave it part of the credit; 83 had had no problem of this kind before or since. Similar investigations on liability to industrial accidents brought 223 replies; 112 reported no change, 47 a large reduction chiefly or partly due to prohibition, 27 a small reduction, and 41 reductions due to other causes. Prof. Feldman, in summarising these results, says: "The most definite fact is that over a fourth credit prohibition with reducing accidents due to liquor, while not a single person asserts it made accidents more frequent." In Great Britain a progressive improvement in accident statistics has run pari passu with a decline in drink consumption, but the connexion is only inferential. With regard to the actual effect on industry, President Hoover in 1925 said that direct comparison of production efficiency before and after prohibition gave an increase of 10 per cent. in output. A firm of electrical engineers, who some years ago decided to run on total abstinence lines, averaged lost time at one-half of 1 per cent., where elsewhere in this trade the figure averaged 10 per cent.; and where returns for firms with 100,000 workers gave an average of 5 per cent. for lost time for sickness and accidents, this firm's figure was 1·4 per cent. Though none of these instances is definite proof of trade improvement due to removal of alcohol, their tendency is obviously in this direction. In discussing crime caused by alcohol, Sir Josiah gave it as his opinion that the economic cost of crime, as measured by the loss of productive output of the criminal, is not high. The number of persons leading a *life* of crime is comparatively small, and these, if successful, are seldom excessively alcoholic. Crimes due to alcohol are usually acts of impulse and violence, and the performers are commonly full producers as ordinary citizens. To the loss of production during imprisonment, which is relatively small, must be added the withheld products of the chronic alcoholics. He also distinguished between the actual loss to the country by absence of produc on, and the distribution for relief of these persons of funds which might be otherwise employed; this expenditure does not represent a loss of wealth, but only a maldistribution of wealth already produced. The only true loss is the loss of production on the part of persons incapacitated by alcoholism. There remain, however, the economic costs of dealing with criminals —expenditure on police, justice, gaols, &c.—and these are high.

In summarising his views on the effect that suppression of alcohol would have on economic output, Sir Josiah said: "The whole matter may be summed up by my saying that those who put the economic difference at less than 8 per cent., and those who put it at more than 15 per cent., both speak against the weight of the evidence."

MORE NEWS ABOUT DICHOTOMY.

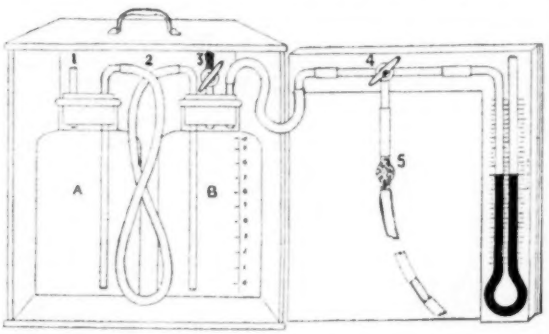
A FORTNIGHT ago the *Newcastle Journal and North Star* gave its readers in Newcastle and elsewhere lurid tidings through the London correspondent of the paper who has reason to believe that a number of "Harley-street specialists" have developed the practice of giving general practitioners a portion of the fee charged to the patient. Further, he finds that "the Harley-street man . . . is confronted with a growing demand that he should return half the fee" to the general practitioner, whether or not he has personally attended the consultation or operation. This is described as a growing demand. We certainly ought to be scared by this picture, and assuredly we should be if our experience coincided with that of the writer of the paragraph. We should reflect that the general practitioner may become less rapacious or the specialist less pliable. Otherwise it would seem inevitable that the specialist will soon have to hand over the whole of his guineas to the recommending doctor, with the hope that the latter may be generous enough to refund him something. The London correspondent may infer correctly that consultant fees will be increased, but the increase will not be due to the situation which he suggests—namely, that the consultant is beginning to feel a shrinkage in his income, because if he will not pay the bribe no doctor will recommend him, while if he pays it his earnings may be halved. Impaled upon the horns of a dichotomy, such an one would deserve our pity, but the character belongs to fiction. Some time ago there was considerable discussion of the alleged practice of secret fee-splitting. Concerning its ethical and legal aspects there is no need to add anything to what is said of it in "The Conduct of Medical Practice." If, however, any member of the public in Newcastle or elsewhere now fears the worst, he

[2] Guy's Hospital Gazette, Dec. 14th, 1929, p. 493.
[3] Brit. Jour. of Inebriety, January, 1930, p. 1.

may yet think it worth while first to await the production of more evidence than has hitherto been vouchsafed. If he believes that, next time he has occasion to use the services of a specialist, he will find the fees automatically doubled by some corrupt bargain on the part of his family doctor acting as his trusted agent, he might ask the latter to tell him the truth.

AN IMPROVED ARTIFICIAL PNEUMOTHORAX APPARATUS.

OF the various forms of apparatus used in artificial pneumothorax, the original Lillingston-Pearson still appears to be the simplest, cheapest, and most generally used. E. H. Stokes and A. J. H. Stobo,[1] by introducing some minor modifications, have made it simpler and more practical. They say that in the original apparatus the clips are unsatisfactory in that they are apt to become worn and to slip, thus allowing air-leaks to occur, and that there are too many of them. For the proper working of the clips, thin-



walled rubber tubing is necessary, and in time it becomes flattened, tending to interfere with the flow of air. They also maintain that the arrangement of the tubing is clumsy. To overcome these disadvantages, and to make the apparatus more portable, they have arranged that the box (see figure) shall be 12 in. high, 9 in. wide, and 6 in. deep. A three-way glass tap (4) attached to the door of the box controls the air passing from the bottle (B) to the patient, and to the manometer. The manipulation of the air-flows is thus simplified, and the wings of the glass cock, on which is a small black dot, indicate the direction and patency of the air channels. If desired, the tap may be turned in such a way that all three channels are shut off, as shown in the diagram. In order to allow the refilling of bottle (B) with air, a glass tube packed with sterile wool and fitted with a two-way glass tap (3) has been inserted into the cork. Thick rubber tubing is used throughout. The authors say that they have used the modified apparatus in their work with complete success during the past five months.

We regret to announce the death of Sir George Dancer Thane, professor of anatomy at University College, London, from 1877 to 1919, and later a chief inspector for the Home Office under the Cruelty to Animals Act.

INDEX TO "THE LANCET," VOL. II., 1929.

THE Index and Title-page to Vol. II., 1929, which was completed with the issue of Dec. 28th, is now in preparation. A copy will be sent gratis to subscribers on receipt of a postcard addressed to the Manager of THE LANCET, 7, Adam-street, Adelphi, W.C. 2. Subscribers who have not already indicated their desire to receive Indexes regularly as published should do so now.

[1] Med. Jour. Australia, Nov. 2nd, 1929, p. 640.

The Clinical Interpretation of Aids to Diagnosis.

A Series of Special Articles contributed by Invitation.

LIX.

SIGNIFICANCE OF THE BLOOD CALCIUM.

PART I.*

CALCIUM is essential to the normal metabolism of all living organisms. It enters the body via the food, is absorbed through the alimentary canal, exists at a more or less constant level in the blood stream, is stored in the bones, and is excreted via the urine and the fæces. While calcium has been used in some form or another as a therapeutic agent for a very long time, within recent years, following the development of the technique of blood estimations, a more definite rationale for treatment has been evolved. The metabolism of calcium is intimately related to that of phosphorus, and both play a prominent part in the growth of the organism. The study of the changes in calcium metabolism is thus important in many infantile disorders. Interest has been further roused in the metabolism of calcium through the preparation of an active parathyroid extract, which possesses the property of increasing the blood calcium even in normal animals.

In health the blood calcium content is remarkably constant—at a figure between 9 and 11 mg. per 100 c.cm. of serum. Evidence has accumulated to show that about 60 per cent. of the calcium in the blood is in a diffusible form and 40 per cent. is non-diffusible. This non-diffusible fraction is more fixed, and probably is combined with protein, while it has been shown that the diffusible portion supplies the free ionised calcium. Electrometric determinations have shown that the serum contains only about 2 mg. per 100 c.cm. of free calcium ions. Symptoms of calcium deficiency are present when the ionisation of this amount is impeded, and when the amount of the diffusible fraction is low. This has been the explanation put forward when a low total blood calcium is found in patients who do not show any signs of a calcium deficiency—that although the serum calcium in toto is low, the diffusible fraction is not affected in the same degree, and in consequence the active fraction is within the normal range of 2 mg. On this view no dogmatic statement can be made, for the technical difficulties in determining the accurate proportion of these two fractions in the blood serum are such that sufficient analytical data have not been produced. Until more reliable and easier methods come into general use, views upon these diffusible and indiffusible fractions have to be accepted with limitation.

The ordinary estimation is performed on the blood serum, a quantity of 2 c.cm. being sufficient. The principle of the method is the precipitation of the calcium as calcium oxalate by the addition of a known amount of ammonium oxalate. This precipitate is freed of all excess of ammonium oxalate by washing with ammonia and then dissolved in sulphuric acid. The oxalic acid liberated is then titrated with a dilute solution of potassium permanganate. The method is reliable, and yields in experienced hands very constant results.

Factors which influence the calcium metabolism and the level of serum calcium are the amount of calcium ingested with the food, the amount of calcium absorbed through the gut, and the proper control exerted by the secretion of the parathyroid gland. Undoubtedly there are other factors, but it is well known that when the food ingested is free of calcium tetany occurs and the blood calcium falls. It is

* Part II. will appear next week.

also a fact that in rickets there is a great loss of calcium in the fæces, and it is believed a deficient absorption from the intestines, with a corresponding low value of calcium in the blood serum. Again, when the secretion of the parathyroid gland is absent, low calcium values are observed, and symptoms of calcium deficiency are manifest. Provided therefore that the diet is adequate in calcium, that the alimentary tract is able to absorb a sufficiency, and that there is no defective function of the parathyroid glands, it appears that the blood calcium will be at a normal value, and no signs of calcium deficiency observed. There are one or two reservations to this statement, for exceptions are seen. The ratio $\frac{Na+K}{Mg+Ca}$, first pointed out by Loeb, which draws attention to the opposite effects of the two groups of elements, may explain how symptoms resembling a calcium deficiency may be present and yet the calcium be found to be within normal limits. If the sodium in the serum is increased at the expense of the calcium signs of tetany may occur, as is seen when sodium phosphate is given to cases of latent tetany; when whey supplants milk in the infant's dietary, electrical hyperexcitability may be demonstrated, although the blood calcium be found at a normal level. The high Na content of whey is regarded as being the factor disturbing the balance of $\frac{Na}{Ca}$ and resulting in a latent tetany. Again, it often happens that a low blood calcium is encountered in cases which do not show any active or latent tetany; such examples are found in nephritis, renal rickets, and the adult form of uræmia. The explanation offered for this apparent anomaly is that a state of acidosis exists, and any process which tends to produce an acidosis increases the ionisation of calcium—so that although the total calcium value may be low the ionised fraction is within the normal limits. Any reverse state such as alkalosis produced by the ingestion of excessive doses of bicarbonate, persistent vomiting of acid juice, or hyperventilation of the lungs (with washing out of CO_2), may result in tetany, but with no diminution of serum calcium. The explanation offered here is that the ionisation is impeded by the alkalosis present. Although no definite proof has been produced, this dependence of ionised calcium on the acid-base equilibrium is interesting, and certainly furnishes a more complete explanation of the various types of tetany.

Hypocalcæmia.

Any value of blood calcium below 9 mg. per 100 c.cm. is regarded as within the pathological range. Rarely does the value fall below 4 mg. Symptoms are frequently present when a value below 8 is obtained, and almost invariably when the calcium is less than 6 mg. per 100 c.cm.

Tetany.—The main disturbance and most obvious in all conditions in which there is a fall of calcium, acute or chronic, is that called tetany—the name given to the clinical condition in which hyperexcitability of the neuromuscular apparatus is the essential basis. All gradations of severity from the acute form with convulsions to the mild and latent, with only an increased irritability to galvanic stimulation, are encountered. In the acute form the calcium may fall to a level of 5 or 4 mg., but when the condition has existed for some time, although the calcium may still remain within the low range, the symptoms of active tetany are absent. It seems that the body is able in time to adjust itself to this abnormal level, although active tetany may be precipitated by œstrus in dogs and menstruation in human subjects; pregnancy is certain immediately to convert a latent into an active tetanic state. This hypocalcæmia can always be relieved by the administration of calcium salts, either rapidly by the intravenous route or more slowly by the ingestion via the alimentary canal.

The conditions in which hypocalcæmia is found are spasmophilia, rickets, renal dwarfism, cœliac disease, osteomalacia, parathyroidectomy, and renal disease. These conditions, and also that of hypercalcæmia, will be considered next week.

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THE LANCET, 1928, Vol. II.: I.—Widal or Agglutination Reaction with Diagnosis of Infections due to Enteric Group of Micro-organisms, by Dr. A. B. Rosher (p. 461). II. and III.—Reports on Swabs from the Throat and Nasal Passages, by Dr. J. E. McCartney (p. 514 and p. 565). IV. and V.—Reports on Sputum, by Dr. S. Roodhouse Gloyne (p. 614 and p. 667). VI. and VII.—Reports on the Cerebro-spinal Fluid, by Dr. G. J. Greenfield (p. 716 and p. 770). VIII.—Significance of Hearing Tests, by Mr. Harold Barwell (p. 830). IX. and X.—The Blood Count, by Dr. S. C. Dyke (p. 936 and p. 988). XI.—The Arneth or Polynuclear Count, by W. E. Cooke (p. 1040). XII. and XIII.—Tests of Renal Efficiency, by Dr. G. A. Harrison (p. 1092 and p. 1143). XIV. and XV.—Determination of the Presence and Significance of Reducing Substances in Urine, by Prof. E. C. Dodds (p. 1200 and p. 1255). XVI.—Chemical Examination of Fæces, by Dr. J. H. Ryffel (p. 1353).

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THE LANCET, 1929, Vol. II.: XXXVI. and XXXVII.—Charts of Fractional Test-meals, by Dr. T. Izod Bennett (p. 35 and p. 82). XXXVIII.—The Schick Test, by Dr. R. A. O'Brien (p. 241). XXXIX.—The Dick and Schultz-Charlton Tests, by Dr. R. A. O'Brien (p. 296). XL.—Examination of the Blood for Bile-pigment, by Dr. John H. Anderson (p. 346). XLI.—Cholecystography, by Dr. John H. Anderson (p. 400). XLII. and XLIII.—Significance of the Acid-base Balance in the Blood, by Dr. John R. Marrack (p. 512 and p. 569). XLIV. and XLV.—The Wassermann Reaction in Adults, by Dr. T. E. Osmond (p. 624 and p. 677). XLVI. and XLVII.—Microscopic Examination of Fæces, by Dr. S. W. Patterson (p. 727 and p. 785). XLVIII.—Diagnosis of Gonorrhœal Infections in the Male, by Dr. A. B. Rosher (p. 836). XLIX.—Urethral and Vaginal Discharges, by Mr. Frederick Roques (p. 890). L.—Microscopic Findings in Dermatology, by Dr. H. C. Semon (p. 940). LI.—Tests of Sterility and Fertility in the Male, by Mr. Kenneth Walker (p. 995). LII. and LIII.—Diagnosis of Acute Food Poisoning, by Dr. William G. Savage (p. 1054 and p. 1107). LIV., LV., LVI., LVII., and LVIII.—Radiograms of the Alimentary Tract, by Prof. A. E. Barclay (p. 1158, p. 1210, p. 1272, p. 1322, and p. 1377).

The Services.

ROYAL NAVAL MEDICAL SERVICE.

New Year Promotions.—Surg. Comdrs. to be Surg. Capts.: F. J. Gowans, L. Warren, and S. F. Dudley.

Surg. Rear-Admiral R. W. Basil Hall, who is relieved at the Admiralty by Surg. Capt. G. L. Buckeridge, is appointed in charge of Plymouth Hospital in succession to Surg. Rear-Admiral R. St. G. S. Bond.

Surg. Comdr. J. Bourdas is placed on the Retd. List with the rank of Surg. Capt.

Surg. Comdr. R. F. P. Cory is appointed to *Victory* for R.N. Hospital, Haslar.

ROYAL ARMY MEDICAL CORPS.

REGULAR ARMY RESERVE OF OFFICERS.

Capt. J. A. W. Ebden relinquishes his commn. on appointment to a permanent commn. in the Ind. Med. Serv.

INDIAN MEDICAL SERVICE.

Capt. J. H. Barrett to be Maj.

ROYAL AIR FORCE.

New Year Promotions.—Squadron Leader T. J. Kelly to be Wing Commdr.

Flight Lt. Maurice O'Regan is transferred to the Reserve, Class D (ii).

COLONIAL MEDICAL SERVICES.

Dr. G. C. Strathairn, Senior Sanitary Medical Officer, Jamaica, has been promoted to Director of Health, Cyprus.

Public Health Services.

ANTI-TUBERCULOSIS WORK IN THE COUNTY OF LANCASTER.

Dr. G. Lissant Cox's report for 1928 shows clearly that the medical staff of the county are alive to the need for research into the prevention and treatment of tuberculosis, especially research for which a large county area provides exceptional facilities. The county council have encouraged the tuberculosis medical service to give trials to the various new methods of treatment which are, from time to time, recommended as "cures" for tuberculosis, provided, of course, that there are patients prepared voluntarily to coöperate. A sum of £200 per annum has been voted for the purpose, and since the resources of the county scheme (services of staff, use of premises, laboratory facilities) are available without charge against the research fund, and new preparations are often offered for trial free of charge, the sum has gone a long way.

In addition to testing new remedies, the medical staff have analysed the histories of 1486 children under five years of age, living in 1063 homes, in each of which there were one or more adults suffering from tuberculosis. There was no selection of cases by tuberculosis officers, and no undue proportion from any particular area or areas. Of the children dealt with in this research, the substantial majority remained, throughout their period of observation, in constant contact with an adult tuberculous case in their homes, after allowing for those adults who received several months institutional treatment and for a small number of children who were removed for varying short periods to the homes of relatives. The death-rate from non-pulmonary tuberculosis of children exposed to risk in tuberculous households from an adult with positive sputum was found to be greatly in excess of the general rate from the same cause in the county—nine times greater in the age-group 0–1, 14 times greater in the age-group 1–2, and 19 times greater in the age-group 2–5. This great excess of non-pulmonary tuberculosis was mainly due to deaths from tuberculous meningitis which accounted for two-thirds the mortality in the non-pulmonary group, ages 0–5.

Similarly (although statistically insignificant owing to the probable error due to chance) the death-rate from non-pulmonary tuberculosis of children exposed to risk in tuberculous households with an adult case or cases suffering from pulmonary tuberculosis with negative or no sputum, was also in excess of the rate from the same cause among children in the county, the rate being three times greater in the age-group 0–1, four times greater in the age-group 1–2, and ten times greater in the age-group 2–5. The number of deaths from pulmonary tuberculosis of children exposed to risk in tuberculous households was too small to justify any conclusion. The mortality-rate from tuberculosis was greater amongst the children of tuberculous positive sputum mothers than fathers. It seems that Calmette's calculation, that in France 24 per cent. of the children of tuberculous mothers die from tuberculosis in the first year of life if left with the mother is many times higher than the Lancashire experience. The latter shows that the death-rate from tuberculosis for corresponding Lancashire children was 3·2 per cent.; from all causes the rate was only 11·5 per cent. Further, the Lancashire investigation shows for children observed from birth to four years of age a death-rate, from tuberculosis and from all causes, a little lower than the French figure for children observed from one month to four years vaccinated with BCG; and much lower than for the French children unvaccinated with BCG.

Taking a period covering the whole first five years of life, those children who were in contact at home with an adult person suffering from pulmonary tuberculosis (whether sputum positive or negative) did not have a higher mortality from all causes when compared with the expectation of life of children in England and Wales. Full details of this work are embodied in a special report, issued by the county, which was also reprinted in *Tubercle* for August of last year.[1]

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following are some 1928 statistics of nine districts, varying in local government status:—

Name of district and estimated (R.-G.) mid-year population.	Birth-rate.	Death-rates per 1000 of the population.					Death-rates per 1000 births.		
		All causes.	Tuberculosis.	Cancer.	Respiratory diseases with influenza.	Heart disease.	Infant and neonatal mortality.	Young child (1–5 yr.) mortality.	Maternal mortality from childbirth.
Bolton C.B. .. (181,200)	14·3	12·8	0·77	1·35	2·4	1·7	64/26	37	3·1
Kensington M.B... (178,200)	14·3	13·0	0·74	1·78	1·9	2·4	83/27	49	2·7
Willesden U.D. (176,589)	15·1	9·8	0·71	1·36	1·5	1·6	57/27	27	3·7
Isle of Ely County.. (77,780)	19·3	11·7	0·92	1·80	1·5	1·9	59/—	25	4·0
Cambridgeshire.. (72,440)*	15·5	12·6	0·76	1·85	1·5	2·2	62/—	15	5·3
Cambridge B.. (60,860)	12·8	10·9	0·80	1·74	1·6	1·3	55/29	23	2·6
S.-W. Kent United Health Area.. (81,756)	14·0	12·6	0·77	1·90	1·4	2·4	48/—	—	0·9
Chesterfield R.D.. (85,000)	21·0	10·0	0·76	1·06	1·6	1·2	76/—	—	3·3
Hereford R.D. (13,320)	16·6	11·0	0·75	1·05	1·5	2·0	36/18	—	4·5

* Excluding Borough of Cambridge.

Relation of stillbirths to live births: Kensington 2·6 per cent. (N.). Willesden, 3·5 per cent. (R.). Cambridgeshire, 2·6 per cent. (N.). Cambridge, 4·6 per cent. (N.).
N. = notified. R. = registered.

Bolton.

Dr. C. W. Paget Moffatt shows that the infant mortality-rate was ten less than it has ever been before in Bolton, and that the neonatal rate, which is usually high in Bolton, was also lower than ever before. The rate for the latter (26) may be compared with an average rate of 39 for the ten years 1918–27. The maternal mortality-rate was also comparatively satisfactory. The Haslam maternity home (18 beds), a fine building situated in pleasant and extensive grounds and presented to the town by the late Mr. J. P. Haslam, is much appreciated. Over 300 cases were admitted for confinement, and all expectant mothers on the admission list attend the antenatal clinic, except those who are having antenatal care from their own doctor. Another municipal antenatal clinic was attended by 136 patients, the total number attending both clinics being 444, whilst the births numbered 2593. Dr. Moffatt is of opinion that, according to Bolton experience, the recent apparent increase of cancer in females is confined to growths in inaccessible sites, and that most of the apparent increase in males is also due to more accurate diagnosis.

The Bolton corporation now own the whole of the gathering grounds of their water-supply, and all but five of the farms thereon have now been evacuated, and arrangements have been made to deal with the remainder during the course of the next few years.

[1] See also THE LANCET, 1929, i., 1201.

Bolton still has 2816 pail-closets and 1840 privy middens needing conversion or demolition. Of the 43,000 water-closets, 15,000 are of the "waste-water" type. The permissible limit for black smoke is two minutes in the half hour but bursts of dense black smoke for periods of less than 30 seconds are not counted. Dr. Moffatt states that no stricter standard is adopted in the Manchester area. In Sheffield, however, the limit for a chimney serving one boiler furnace is two minutes in an hour's observation, with no exception for short bursts, and apparently the Bolton chimneys had no difficulty in conforming to their more lenient standard, as out of 642 half-hour observations there was only one emission exceeding two minutes. The number of new houses erected dropped from 1081 in 1927 to 479 in 1928. Out of the 479 there were 416 subsidy houses, 160 municipal, and 256 by private enterprise. In order to facilitate the clearance of slum areas, Dr. Moffatt suggests that houses might be built in a central position, to be tenanted in turn by the inhabitants of the various slum areas during the period of reconstruction, and also that poor class property might be purchased, renovated, and used in the same way. At the time of writing, by-laws for houses let in lodgings urgently needed are awaiting the approval of the Ministry. The charges made for these rooms are "in many cases grossly exorbitant," and the amenities provided are "miserable." Dr. Moffatt would also like to see two-roomed dwellings provided for childless elderly married couples or married couples whose children have left them, as such people are an important factor in the slums, whose needs are not catered for by private enterprise. There are 129 cow-keepers in the borough, and the cows kept number 2725. One farmer has a licence to produce Certified milk. During the year five cows were found to be giving tuberculous milk and were dealt with under the Order. One farmer was fined £10 for failing to notify a cow suffering from tuberculosis of the udder.

There were 13 notifications of encephalitis lethargica and 11 deaths; 3 of the patients who died had not been notified. Dr. Moffatt comments on the lack of suitable provision for the after-effects of this disease. There were 840 notifications of scarlet fever with 1 death; 465 were admitted to hospital, "where all cases which are not quite definitely mild receive the scarlet fever antitoxin, the effects of which are really wonderful." There was no death in hospital, but an unusual number of cases of otorrhœa, and Dr. Moffatt thinks such complications of scarlet fever are apt to occur in cycles. Dr. Mary Boullen, who conducts the light clinic, found that long-continued attendance, with moderate exposures, gave better and more permanent results than attendance over a short period with more rapidly increasing exposures. She thinks that, taking everything into consideration, the clinic continues to justify its existence, and that the mothers who attend regularly are appreciative of the improvement in the condition of their children and are satisfied with the results of treatment.

Kensington.

Dr. James Fenton reports that the rheumatism supervisory clinic, established towards the end of 1927, has made good progress. A report on the first year's working, published as a separate document, shows that much research has been initiated, both from the environmental and the clinical points of view. There were 159 notifications of acute rheumatism during the year ended Oct. 1st, 1928, and of these 81 were seen at the centre, in 8 of whom the diagnosis was not confirmed, and in 6 of whom it was doubtful. A series of 200 cases has come under review, and the study of the prevention of relapses has made a good start. Dr. R. C. Lightwood, who is in charge of the clinic, was granted six months' leave of absence in order to undertake special work at another hospital, and his position has been temporarily filled by Dr. Francis Bach. The comprehensive municipal tuberculosis scheme has not been materially altered since it was adopted seven years ago, and includes among its features a very representative "care" committee and efficient arrangements for following up suspects and contacts. Dr. Fenton is able to report that the decline in the death-rate from tuberculosis still continues. During the first three years of the last decennium the death-rate per 100,000 from all forms of tuberculosis was 131, 109, and 105; during the six years, 1922–27, the rates were successively 95, 85, 83, 89, 89, and 80, and during 1928 the rate for the first time got into the seventies.

An unsatisfactory feature of 1928 was the rise in the infant mortality-rate from 68 in 1927 to 83. Dr. Fenton attributes this rise very largely to measles, to an increase in premature births, and to an increase in illegitimate births. Since the war the three years with the highest infant mortality—namely, 1921, 1925, and 1928—have been those with the highest number of illegitimate births. Kensington includes a large population of unmarried women, and in the southern half there are two female for every male elector. There is a large number of unmarried female shop-assistants and domestic servants. In 1928, 9·4 per cent. of the births in Kensington were illegitimate, and accounted for 23 per cent. of the infant deaths. Out of the total of 213 infant deaths, 52 occurred in the first week of life, and 70 in the first four weeks; whilst out of the deaths of the 51 illegitimate children 17 died in the first week and 31 in the first four weeks. In 1928 there were 2559 births in Kensington, and it is estimated that 443 occurred in families financially outside the scope of the council's M. & C.W. scheme. In respect of the remaining 2116, 1456 of the expectant mothers attended the special antenatal clinics held at Queen Charlotte's Nurses' Home and other institutions. This means that 70 per cent. of the expectant working-class women receive antenatal treatment, but Dr. Fenton is not satisfied with this percentage, and expects to increase it. Dr. Remington Hobbs, the borough's consultant gynæcologist, has accepted the duty of investigating for the Ministry every case of puerperal fever and each maternal death.

Pneumonia and broncho-pneumonia, mainly associated with the widespread outbreak of measles at the beginning of the year, were responsible for 59 infant deaths. The heaviest incidence of the London outbreak of paratyphoid fever was felt in Kensington, where 66 cases were notified between July 25th and Sept. 1st. Only one death was attributed to this cause during the year. During the course of the epidemic statements appeared in the press that if the addition of boric acid to cream had still been permissible the epidemic might not have occurred. Dr. Robert Donaldson, the bacteriologist to the borough council, carried out tests from this point of view, and found that even when 4 per cent. of boric acid was added to cream the growth of paratyphoid B in it was not prevented, and 4 per cent. of boric acid is ten times more than the maximum allowed in cream prior to Jan. 1st, 1928.

The Kensington housing problem presents many special features. Thus there are 2091 mews dwellings, and 5690 houses let in lodgings, occupied by several families, instead of by one as originally intended, whilst fortunately the most unsatisfactory form of dwelling—the houses let in furnished rooms—has been decreased from 187 in 1912 to 34 at the end of 1927. There are also 13,000 basements used for dwelling purposes, with ceilings at or below the street level in 640 cases. Unsatisfactory common lodging-houses for women have been closed, and better accommodation provided by private philanthropy and voluntary associations. The council have built about 600 houses and flats, and arranged for the removal of 674 families to the L.C.C. Wormholt Estate, adjacent to N. Kensington. Many trusts have provided blocks of dwellings managed on the Octavia Hill system. Dr. Fenton is able to record great efforts made by the coöperation of the borough council and voluntary housing associations. Cases of overcrowding are becoming less numerous and less difficult to deal with. He points out that legal standards of habitability are necessarily low, and that

all is not satisfactory. For example, with few exceptions, the 13,000 basements comply with the legal standards for underground rooms, but nevertheless damage to health must result from thousands of people in Kensington having no living or sleeping rooms other than in basements. Even if new legislation were secured to close the most undesirable of these basements, it could only be enforced very gradually in the absence of accommodation for the persons displaced either in Kensington or outside.

Willesden.

Dr. George F. Buchan mentions that early in the year a large electric generating station extended the use of pulverised coal for steam raising, and that within a short time numerous complaints were received from householders and business establishments as to a serious nuisance from the emission of grit. Observations were made and the grit deposited in trays in the neighbourhood of the works was collected and weighed. As the result of a conference, the company installed grit-arresting and water-screening apparatus, which has lessened the nuisance, but it has been ascertained that another company is about to instal another plant for using pulverised fuel. Immunisation against diphtheria was adopted for the hospital staff in 1926 with satisfactory results, and in May, 1927, Dr. A. G. Troup, the medical superintendent of the municipal hospital, was authorised to offer immunisation at one of the clinics. The bulk of the work in 1928 consisted in establishing the results of the 1927 immunisations, while the advent of fresh cases was disappointing. It is thought, however, that the result of the first year's immunisations will stimulate interest.

Dr. H. Haldin Davis, in his report on the artificial light clinic, shows that many of the patients suffered from vague ill-health, 81 being classed as general debility and malnutrition, and 28 as pretuberculous. Treatment in these cases had satisfactory results, as also in asthma, rickets, and septic skin conditions. The work is handicapped by being carried out "in a draughty underground room of scanty dimensions." Dr. Agnes H. Nicoll, on information from all available sources, concludes that the Willesden school entrant of the last two years has begun school life in much better physical condition and more healthily clad than in 1907. The defects of throat and nose are less grave in degree than formerly, but the condition of the teeth is still far from satisfactory. Functional derangements of the nervous system have not noticeably changed for the better, and the entrant has failed to regain the pre-war level in nutrition. Dr. Bessie R. Mackenzie reports on antenatal work, the first clinic having been established on Nov. 1st, 1916. She describes the essentials of a clinic, and states that it "should be in charge of a competent medical officer—preferably one who has had considerable practical experience in midwifery." One feels that the words "preferably one" should have been omitted. Dr. Alice J. Gray reports on maternal mortality and morbidity in Willesden, 1919–28. During this period there were 123 deaths from childbearing—a maternal mortality-rate of 4·1 per 1000 births. The primary causes of deaths were: sepsis 51, toxæmia 17, hæmorrhage 14, abortion 13, thrombosis and embolism 7, abnormal labour 6, and other causes 15. Of the 13 fatal abortions 3 were criminally induced. The sinister effect of illegitimacy is shown in a table. Thus, during these ten years, for 29,413 legitimate births, there were 115 maternal deaths—a rate of 3·9. Whilst for 962 illegitimate births there were 8 maternal deaths—a maternal mortality of 8·4. In 102 of these fatal cases 33 of the babies were born prematurely, and in 20 of the 123 the baby was stillborn. As regards morbidity, the health of 13,012 mothers attending the Willesden clinics during the 12 months following delivery was investigated, and some morbid condition was noted in 42 per cent. The commonest morbid conditions found were: white-leg, 19 per cent.; breast abscess, 17 per cent.; prolapse, 14 per cent.; perineal tears needing operation, 11 per cent.; and varicose veins, 9 per cent.

Isle of Ely.

Dr. R. French, who presents the report, took over his duties during 1929. The Isle of Ely chiefly uses resident institutions outside the county. Thus five cases of difficult labour were treated at Addenbrooke's Hospital, where also the most used V.D. clinic is held; and 64 tuberculosis patients were sent by the county council to 12 different sanatoriums and hospitals. Great difficulty is experienced in finding institutional accommodation for the various grades of mental defect. About 70 samples of milk are analysed every year, and a curious variation in the average percentage of fat is disclosed. Thus the average fat percentage for 1925 was 3·8, for 1926 3·5, for 1927 3·67, and for 1928 3·85. Items from the districts include: complaints of river pollution by sewage and beet-sugar effluent (Ely U.D.); satisfaction at the relief of unemployment by the sugar-beet factory (Ely R.D.); pollution of the Nene by gasworks washings (March U.D.), and the clearance of a slum area (Wisbech borough). The fruit pickers in Wisbech R.D. are reported to be well housed, and their allotted quarters are inspected just before occupation. A case of encephalitis lethargica was landed from a ship in Wisbech port, and died within a few days.

Cambridgeshire.

Dr. Frank Robinson's report shows that provision for maternity cases was improved by the opening of two new maternity wards to accommodate eight patients in Addenbrooke's Hospital. The county council, however, are still anxious to arrange with the hospital for the provision of a 20-bed maternity home, with an antenatal clinic attached. The council paid for the maintenance of 28 mothers, including sepsis cases, at Addenbrooke's, and also maintained four unmarried mothers at the Ely Diocesan maternity home. In connexion with the latter a babies' home has been recently opened for the reception of infants whose mothers have obtained situations in the neighbourhood. All the 50 midwives who practise in the administrative county are trained women, and through the agency of the County Nursing Association, which is subsidised by the county council, the number of rural parishes without the services of a nurse-midwife has been reduced to 19, with a population of 5738. The county council, having no institution of their own, maintain mental defectives at about 20 outside institutions. A joint scheme with Essex and West Suffolk for adding 34 places to the accommodation has been mentioned since 1924, but has not yet materialised. The county council are of opinion that the public is misled into thinking that Grade A is the highest standard of milk, and ask for the support of all county councils in favour of the alteration of the designations. The only action taken under the Housing (Rural Workers) Act was by Linton R.D.C., which made grants in respect of 16 cottages, all of which were successfully reconditioned.

Cambridge.

Dr. Andrew J. Laird shows that 16·9 per cent. of the births and 29·2 per cent. of the deaths took place in institutions. During the last five years about one-third of the infant deaths have been due to premature birth, and about one-fifth to bronchitis and pneumonia. During the same period there have been five maternal deaths from sepsis and two from other puerperal conditions, giving a maternal death-rate of 1·2 per 1000 births from sepsis, and a total rate of 1·7 from childbirth. Mr. W. B. Grandison's scheme for the dental treatment of mothers and children under the school age continues to grow. Apart from the encouragement of breast-feeding, the essentials laid down by Mr. Grandison are mainly mechanical—e.g., washing the baby's mouth with dilute boric after each feed; the abolition of the dummy and of thumb- and finger-sucking; and the provision of something hard to chew at. After the child has cut

four teeth the essentials laid down are: its enrolment in the dental scheme; the purchase of a toothbrush and its use after each meal; the provision of a tooth-cleansing food after each meal; and the bringing up of the child to the clinic every six months. Mr. Grandison states that if these instructions are carried out every child should reach school age free from dental disease. The number of children in their fifth year enrolled in the scheme were 197, and a table shows that they had 3280 sound, 472 decayed but saveable, and 95 decayed and unsaveable teeth. Further, 25 permanent molars had erupted at this age, of which nine were decayed but saveable. Mr. Grandison does not mention whether he is satisfied with these results, but there are no controls outside the scheme. Possibly Oxford might start an opposition experiment founded on the work of Mrs. Mellanby, and giving attention to the food needed for building good teeth rather than to the mechanical side. It is surprising that the choice of tooth-building food should have been ignored in the British mecca of vitamins. The pioneer effort of the Cambridge Housing Society in reducing rentals for large families has made progress. This society has built 45 houses, which are occupied by 45 families, including 200 children. The rents without rates are 7*s.* to 7*s.* 6*d.* a week, with a deduction of 6*d.* a week for each child of school age, down to a minimum rent of 5*s.* per week. The accommodation consists of two living rooms (one being the kitchen), three bedrooms and a bathroom, and a good garden. The society has been encouraged by the results to purchase a new site for the erection of 16 more houses.

South-West Kent.

Dr. S. Nicol Galbraith shows that five isolation hospitals treated during the year 444 cases, and that two small-pox hospitals treated one case. There would, therefore, seem to be room for the pooling of accommodation. There is still a shortage of houses. Tonbridge has 200 applicants on its waiting list, and there is a great shortage at Marden in Maidstone R.D. The position is aggravated by well-to-do people buying old picturesque labourers' cottages, and modernising them for week-end cottages. The administration of the by-laws for hop-pickers has made much demand on the department. Some 60,000 Londoners arrive annually for the hop-picking, and in addition thousands of visitors by train and char-à-banc. Although the arrangements have been improved, there is still need for more careful attention to cleanliness, sanitation, scavenging, and especially to water-supply. Dr. Galbraith gives a photograph of what was a common occurrence during the dry season of 1928—the scene of wreckage left by the burning of huts. More care is needed with regard to the lighting of the huts and to the use of gypsy fires. Three children were burnt to death in 1928. One family brought down a child diagnosed as chicken-pox in London. This led to two cases recognised as small-pox at Marden, which were removed to the M.A.B. hospital. Dr. Galbraith thinks that as this invasion of Kent for three weeks is not like an ordinary holiday problem, the London hospitals should take charge of the infectious cases which arise in the camps. If sanitation were reasonably good, one would expect fewer cases of infectious disease to develop among the 60,000 Londoners while they occupy the camps and lead an open-air life, than if they had lived at home for this period. The infectious cases which developed amongst the immigrants were, whilst picking, diphtheria 7, scarlet fever 3, and small-pox 2; and on return to London: diphtheria 5, scarlet fever 9, small-pox 8, and paratyphoid 1.

Chesterfield Rural.

Dr. Herbert Peck says the crying need of his district is the conversion of privies to water-closets, which is dependent upon another need—that of an improvement in the water-supply. At present much of the water in the gathering grounds of the Northern reservoirs goes to waste owing to the shortage of reservoir accommodation. Additional works are now in course of construction, and the principle of the formation of a joint water board with neighbouring districts has been approved. Coal-mining with quarrying gives employment to nearly half the occupied males in the district.

Hereford Rural.

Dr. R. Wood Power says the industries of the district are almost entirely of an agricultural nature. Hops and fruit are largely grown, and there is extensive breeding of Herefordshire cattle and dairying. Much work is in progress under the Milk and Dairies Order. A detailed report has been made of the premises of 200 applicants for registration, and in only 19 instances did the premises comply with regulations. Existing buildings have been successfully dealt with at 100 farms; 8 new cowsheds have been erected and 22 cooling and milk rooms. Photographs of the cowsheds, before and after alterations, illustrate in a striking manner what can be done by gutting the main structure and providing concrete mangers, floors, and channels, metal stall partitions, and better lighting. Arrangements for hop-pickers are much improved since the by-laws came into force in 1909. About 2500 pickers come from outside the county to 22 farms, as few as 6 going to one farm and as many as 700 to another. They are accommodated in barns, stables, cowsheds, and other outbuildings, and also increasingly in specially erected buildings. Some farms have canteens, but in most cases fresh meat, fish, &c., are supplied from tradesmen's vans, visiting periodically. Illustrated posters supplied by the Health and Cleanliness Council have had a good effect.

The District Council has been made the authority under the Housing (Rural Workers') Act, but, in spite of press notices and the circulation of leaflets, has only had two applications, both of which were withdrawn.

Corrigendum.—In our summary last week (p. 103) of Dr. J. Middleton Martin's report for Gloucestershire, the omission of a sentence at line 45, col. 2, made it appear that the remainder of the paragraph referred to the scheme for the extension of medical services, whereas it actually refers to the totally distinct orthopædic scheme. The work done for the former, in fact, included 12,864 attendances at out-stations and 1515 attendances at hospitals, total 14,379, as compared with a total of 11,460 in the previous year—with a corresponding lessening of the cost per attendance.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED JAN. 4TH, 1930.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 248; scarlet fever, 2904; diphtheria, 1695; enteric fever, 38; pneumonia, 1455; puerperal fever, 51; puerperal pyrexia, 97; cerebro-spinal fever, 10; acute poliomyelitis, 6; encephalitis lethargica, 10; dysentery, 6; ophthalmia neonatorum, 88. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the Metropolitan Asylums Board on Jan. 7th-8th was as follows:—Small-pox, 437 under treatment, 27 under observation (last week 415 and 13 respectively); scarlet fever, 2633; diphtheria, 2701; enteric fever, 28; measles, 824; whooping-cough, 126; puerperal fever, 27 (plus 15 babies); encephalitis lethargica, 121; poliomyelitis, 2; "other diseases," 18. At St. Margaret's Hospital there were 14 babies (plus 6 mothers) with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was no death from small-pox, 4 (1) from enteric fever, 47 (22) from measles, 10 (1) from scarlet fever, 21 (5) from whooping-cough, 63 (18)

from diphtheria, 62 (20) from diarrhœa and enteritis under two years, and 64 (11) from influenza. The figures in parentheses are those for London itself.

The 3 deaths from enteric fever outside London all occurred at Newcastle-on-Tyne. Stoke-on-Trent and Wigan each reported 4 deaths from measles, West Ham and Manchester each 3. Cardiff reported 3 deaths from whooping-cough. Diphtheria claimed 4 victims each in Birmingham and Merthyr Tydfil. Of the deaths attributed to influenza 6 were reported from Birmingham, 5 from Bradford.

The number of stillbirths notified during the week was 262 (corresponding to a rate of 37 per thousand births), including 50 in London.

Special Articles.

DENTAL TREATMENT AND NATIONAL HEALTH.

REPORT BY THE NATIONAL DENTAL SERVICE COMMITTEE.

A REPORT issued by the British Dental Association, 23, Russell-square, London, W.C.1, is based on certain unfulfilled recommendations of the Departmental Committee on the Dentists Act (Cmd. 33, 1919), and deals with the dental services which are necessary to the national health under the following heads:—

1. Dental treatment of expectant and nursing mothers and for children up to 5 years of age.
2. Dental inspection and treatment of all children of school age.
3. Dental treatment of adolescents.
4. Dental treatment for all persons insured under the National Health Insurance Act, and for all other adults who are unable to afford dental treatment by private dental practitioners.
5. Dental treatment as an essential element in cases of tuberculosis and of venereal disease.
6. The institution of a coördinated scheme for education in oral hygiene, which would be simple in its application and general in its incidence, but with particular attention to the young, with the object of preventing dental disease.

The suggestions made are in general agreement with the scheme outlined in the Interim Report of the Ministry of Health Consultative Council on Medical and Allied Services (Cmd. 693, 1920). Means are also suggested for the organisation of such dental services, and for the supply of the necessary personnel.

Recommendations.

In brief the recommendations of the Service Committee are these:—

1. That dental treatment be organised at every maternity and child welfare centre.
2. That in the first place the efforts of the profession should be concentrated on obtaining a complete school dental service.
3. That by a suitable scheme of dental treatment for adolescents the complete school dental service be linked up with statutory dental benefit under an amended National Health Insurance Act.
4. That effective supervision and inspection of all public dental services should be carried out by dental practitioners responsible to the controlling authority.

Finally, stress is laid on the importance of education in dental hygiene being consistently emphasised.

KING EDWARD'S FUND.—During the absence of the Prince of Wales in Africa his power as President of the Fund have been confided to a commission consisting of the Lord Chancellor, the Speaker of the House of Commons, and the Governor of the Bank of England.

MEDICAL REFEREES ON INDUSTRIAL DISEASES.

(FROM A SCOTTISH CORRESPONDENT.)

IT is notable what a large proportion of experience in all matters relating to the compensation code for workmen occurs in Scotland. Recently this has been specially observable in the case of miner's nystagmus. The case of Lowe *v.* Wilsons and Clyde Coal Co., decided in the Scottish Court of Appeal and reported in 1930 *Scots Law Times*, 28, makes important reading, for the main point in it applies to the functions of medical referees in all compensation cases based on disablement following on an industrial disease.

The medical referee in that case stated that miner's nystagmus does not necessarily prevent the workman from working underground and drawing full wages; implying a distinction between the date of the commencement of the disease and the date of disablement to earn full wages. It was the failure to make this distinction which tended to create a tangle in the Lowe case. Before the days of compensation in industrial disease cases many nystagmic miners kept on at their work underground, driven by necessity to do so in order to support themselves, their wives, and families. This is still done by determined men, because full wages are more than the compensation allowance.

In these compensation cases based on disablement to earn full wages owing to an industrial disease there is a special sub-code. The workman applies to the certifying surgeon for a certificate that he is suffering from an industrial disease and is thereby disabled from earning full wages. If the certificate is granted the surgeon is to state the date of commencement of disablement if he can; if not, the date of the certificate is taken. Of course, the surgeon may refuse to give a certificate, and then he is not concerned with any date. In either case there may be an appeal to a medical referee. The Act says that, if the referee grants a certificate where the surgeon had refused it, the referee shall fix the date of commencement of disablement. It does not say that, if the referee agrees with the surgeon that the workman is entitled to a certificate, the referee may alter the date which has been fixed by the surgeon. Power "to alter or not to alter," that is the question. There is no judicial decision upon it. It has never even been argued, except in this latest case in Scotland. There have been judicial opinions expressed in England and in Scotland in favour of the medical referee possessing this power, but they are merely obiter dicta, and so is the very definite reasoned opinion to the contrary pronounced by one of the judges of the Scottish Court of Appeal in the recent case. It is worth while to draw attention to the doubt surrounding this question and this latest judicial opinion on it.

The case also has a bearing on the proper way for medical referees to draw up their reports in such cases. They went considerably astray in this respect. The report had to be sent back to the referee to state plainly whether he sustained or refused the appeal from the certifying surgeon, who had found the workman entitled to a certificate. Then the referee added "I therefore sustain this appeal." Even after that, parties were at sixes and sevens as to what the report meant. Probably that was due to the word "therefore," which gave a connexion with preceding matters, some of which was irrelevant and may have been ultra vires. It has to be kept in view that medical men in these cases are not entitled to legal advice, and it is said that the forms supplied to them are the reverse of helpful. Clearly the ordinary professional curriculum should include some degree of instruction in such matters. But the doctor must read the Acts and other documents; he must attend to the specific questions put to him; these he must exhaust; at that point he must draw the line

and refuse to step beyond into matters with which he has nothing to do, and which he may not be qualified to deal with. Reasons and reasonings, comments and explanations, including the process by which he has arrived at his decision, will usually be unnecessary and may be damaging.

Neglect of these rather obvious guides may lead to a report being sent back to its author to explain, not a mere detail, but the cardinal point whether the report is "Yes" or "No." That ought to have been found in a few unqualified and unambiguous words in the first line of the report. The history of this case shows that it must be clearly understood what is the question to which an affirmative or negative answer is being given. The reporter appears to have been misled into importing into his functions a question as to the commencement, not of the disablement, but of the disease. Not only so, but there were also in the report words which appeared to express or suggest that the doctor was applying his mind to the legal question whether a previous cash settlement with the workman amounted to compensation in respect of the disablement for which he was now claiming. It is all in the medical man's own interest that his sphere of function in such matters should be as circumscribed as possible. It may well be that he could add much accurate and valuable information and advice, but he is not instructed to do so nor safe in doing so.

MEDICINE AND THE LAW.

Alleged Negligence: Diphtheria Infection.

As a legal correspondent points out on another page, the recent Scottish case of Carmichael *v.* Miller is of considerable interest. Indeed, the issues of fact in the case, in which a series of allegations of negligence against the late Dr. Miller was dismissed by Lord Fleming at the close of last year, are almost as well worth notice as the issues of law.

Duncan Carmichael, a dairyman near Fort William, had a son Duncan, 2½ years old, who on Dec. 31st, 1925, was admitted to the local hospital suffering from scarlet fever. The disease took a normal course till 26 days later, when what appeared to be a secondary attack supervened with sore-throat, pyrexia, and copious rash, desquamation meanwhile continuing. Dr. Miller, medical officer of health for the burgh and medical superintendent of the hospital, and his assistant, Dr. Mackintosh, diagnosed this as a secondary attack of scarlet fever. Another doctor, and also the fever nurse and matron, agreed. The rash was typical scarlet fever rash and none of the clinical appearances of diphtheria was observed. There was otorrhœa, but this was slight and intermittent, and on March 1st, 1926, the child was sent home. Six days later a sister, aged 8, and a brother, aged 7, were notified as suffering from diphtheria and were admitted to the diphtheria ward of the hospital. The girl died; the boy recovered. Another brother was admitted on April 24th suffering from virulent diphtheria; he eventually recovered. The original patient, Duncan, was readmitted on April 24th suffering from a recurrence of otorrhœa, a brushing of which had shown bacilli resembling those of diphtheria. He was kept in hospital till August 3rd, then discharged as cured (the otorrhœa having ceased), readmitted on August 16th on a recurrence of the discharge, removed to Glasgow in November for enucleation of tonsils and adenoids, readmitted at the end of 1926 on a further recurrence of the discharge, and at length finally released from hospital in June, 1927. This long series of illnesses might well have led his father to suppose that the treatment was in some way at fault: he brought his action against Dr. Miller, alleging negligence in various ways. First, it was suggested, the child, when originally discharged from hospital, showed typical post-diphtheritic symptoms, a squint, nasal speech, and unsteady gait. The evidence of these symptoms was vigorously disputed, and the judge held there was no proof of the presence of diphtheria at the date of original discharge from hospital. Lord Fleming therefore decided that there was no negligence on Dr. Miller's part in failing to diagnose diphtheria if the child really suffered from it. The next allegation was that it was negligent to release the patient from hospital while the ear was still discharging. It was proved in evidence that otorrhœa after scarlet fever may continue for years. Lord Fleming said the evidence failed to establish that it was in contravention of the usual or reasonable medical practice to discharge patients suffering from intermittent scarlet fever otorrhœa. He refused to say that Dr. Miller had fallen short of the ordinary standard of professional care and skill in sending the child home before the otorrhœa ceased; thus the second allegation was disposed of. It was, however, argued alternately against Dr. Miller at this point that he ought to have had a bacteriological examination of swabs from the ear. But there was no proof of any practice at hospitals to take this precaution in the absence of complications. The judge held that there was at this stage nothing to cause Dr. Miller to suspect a diphtheria complication, nor did he so suspect; if, therefore, the child was discharged in an infectious condition, Dr. Miller was not to blame or legally responsible. In view of this finding, Lord Fleming held it to be unnecessary to consider whether the brother and sister became infected with diphtheria owing to contact with the original patient; as, however, the point was pressed in argument, the judge dealt with it. The subsequent bacteriological examinations of swabs from the child's ear were apparently positive in seven cases and negative in five as regards diphtheria. This indicated to the judge that the evidence was far from strong; there was, he said, no clinical history to show conclusively that the child ever suffered from diphtheria; it was not proved that the diphtheria bacilli present in the child's system were of the virulent type. "If I had to decide this question," said Lord Fleming, "I think I should be bound to hold that the pursuer had failed to prove that the diphtheria of which the sister died had been contracted by infection from Duncan." Finally he observed that not only was Dr. Miller not guilty of any negligence, but that the children had received every proper care and attention while in his hands. He added a sympathetic reference to the unhappy misfortunes of the family. Without failing in sympathy to the father of these unfortunate children, the medical profession will have some sympathy, too, for the doctor whose professional reputation was attacked. The proceedings are estimated to have cost Dr. Miller's representatives not less than £1000. As it is understood that there is scant chance of recovering this sum from the unsuccessful claimant, the case (in which the Medical and Dental Defence Union of Scotland undertook responsibility) is another instance of the importance to the medical practitioner of being adequately covered against such losses.

The Question of Law.

With regard to the broader question of law which the legal correspondent has raised, the nature of the claim is similar to that in the action of Evans against the Liverpool Corporation, tried by Mr. Justice Walton in 1906. On that occasion the alleged facts were that a boy, 6 years old, had a mild and ordinary attack of scarlet fever, that he was removed to the corporation's fever hospital for acute cases, and was passed out to the corporation's convalescent home a month later; a few days afterwards one brother, and subsequently two other brothers, developed the disease. The plaintiff said the visiting physician of the convalescent home was negligent in allowing the boy to leave while still infectious; also that the matron and nurses were negligent in examining the boy and reporting his condition. The jury found the physician was negligent, and that the damage complained of was suffered in consequence; the matron and nurses were

not held negligent. The case became a leading authority on the legal responsibility of a public authority like the Corporation of Liverpool for the actions of the medical staff of its hospitals. There was also this further point. The plaintiff contended that the doctor was negligent and that the corporation was responsible for their employee's negligence. But, quite apart from any question of the relationship of master and servant, the plaintiff's counsel argued that the corporation was liable because it had a duty not to discharge a patient likely to communicate infection. There is a well-known principle of English law laid down in the text-book case of Fletcher *v.* Rylands where one landowner constructed on his property a reservoir which afterwards overflowed and damaged the property of a neighbour. The broad principle in Fletcher *v.* Rylands is that a man who keeps a dangerous thing on his property is liable if that thing escapes and causes damage elsewhere. So, in Evans *v.* the Liverpool Corporation, it was argued that the corporation had brought upon their premises a person dangerous to others and were liable if they allowed him to go outside while in a dangerous (i.e., an infectious) condition. Walton, J., came to the conclusion that there was no sufficient ground for holding that any such duty or obligation existed on that occasion.

A patient who sues a doctor for alleged negligence does not necessarily rely upon the existence of an implied contract to use adequate care and skill. Anyone who suffers from medical malpraxis is not obliged to establish privity of contract in order to recover damages. The claim can be put forward as a breach of duty as well as a breach of contract. The doctor who undertakes to treat any patient represents himself as possessing ordinary professional capacity. In the old legal phrase, *spondet peritiam*, he pledges his skill and becomes bound for the exercise of adequate professional care. If by his lack of capacity or care the patient is injured, the patient has an action against the doctor for the breach of the duty owed in this respect. The recent Scottish action, set out at length above, establishes no new principle because, fortunately, the plaintiff failed all along the line. The only point on which Dr. Miller's representatives did not succeed was an initial attempt to invoke the shelter of the Public Authorities Protection Act. That enactment, like the protecting words in Section 330 of the Lunacy Act, has scarcely been as useful to the medical profession as Parliament may be supposed to have intended.

UNITED STATES OF AMERICA.

(FROM AN OCCASIONAL CORRESPONDENT.)

The Sale of Wine Tonics.

THE free sale in drug stores of tonics containing and largely consisting of wine has been a large source of leakage of potable alcohol through the legal sieve of prohibition. Apparently some attempt is to be made to dry up this source and apparently the medical profession will not lend much support to the attempt. The indications are found in a letter to *California and Western Medicine* (December, 1929, xxxi., 445) and in editorial comment thereon. The correspondent encloses a copy of an ordinance recently passed by the city council of Los Angeles prohibiting the sale of wine tonics, defined as "any tonic or any medicinal preparation containing one-half of 1 per cent. or more of alcohol by volume, which is capable of being used as a beverage." The penalty prescribed is $500 for each sale or six months' imprisonment or both. No exemption is made for prescriptions of any kind. The ordinance was passed over protests from the pharmaceutical and medical professions. The mayor signed it after it had been pointed out to him that the definition of wine tonic was such as to include a number of common prescriptions. Several other cities in the State of California are said to be preparing ordinances modelled on that of Los Angeles. Says the editorial writer: "It must be self-evident to any person of reasonable knowledge of the world that an ordinance such as this . . . will not be literally and impartially enforced. This is the kind of law-making which does much to lower the respect of many citizens for all law." It is possible that a referendum will be demanded in which case the ordinance will lie over until election time in the autumn of 1930.

Enforcement of Prohibition.

The report of the prohibition commissioner for the last fiscal year records 66,878 arrests and 55,546 convictions, including 19,074 jail sentences. The aggregate of these sentences amounts to 7443 years' imprisonment. Fines totalling more than $7,000,000 were imposed by the courts. More than 7000 automobiles valued at nearly $3,000,000 were confiscated. Senator Borah has recently attacked the administration on the ineffectiveness of prohibition enforcement. After his speech in the Senate he visited President Hoover, who is said to be contemplating measures for increasing the severity of enforcement.

Infectious Disease.

The report of the Public Health Service now published covers the calendar year 1928. The high incidence of small-pox is maintained. Deaths from pellagra are increasing despite our new knowledge of the ætiology of this disease. The deaths from this cause in 1928 were 6652 as compared with 4794 in 1926. Reported cases of tularæmia were 480 with eight deaths: but that many cases must have gone unreported. The tuberculosis death-rate of 77·5 per 100,000 is the lowest on record in this country. Low records were also made for typhoid fever and for diphtheria. Brill's disease was prevalent especially in the South-Eastern States; 143 cases were reported and 12 deaths. The Department of Commerce reports a general death-rate of 12 per 1000 as compared with a rate of 11·4 in 1927. The greatest increase was shown in deaths from heart disease. Controlled statistics on the efficacy of toxin-antitoxin administration are available in the report of the Detroit Department of Health. There are in the city 153,000 children under 11 years of age who have been immunised, and 142,800 who are still unprotected. There have been no cases of diphtheria among the former group but 1805 cases with 222 deaths among the latter. The city health department has a list of over 800 physicians who will give toxin-antitoxin at stated hours, charging $1.50 per injection to those who can pay and nothing to those who cannot.

Health and Scholarship.

The relationship between health and scholastic attainment has been investigated at the University of Minnesota. Records were made of physical defects, habits of living, and social and economic status of 141 university students who were on probation because of poor scholarship. Corresponding observations were made on 496 students who were doing satisfactory work and who came voluntarily for health examination. The same physicians made both sets of observations and the statistical results were then analysed, the die square test of independence being used to compute the possibility of a chance difference equal to or greater than the observed difference between the two groups. The probation group showed an excess of some physical defects that was almost certainly significant. There were: defective hearing of extreme grade, overweight, flabby musculature, and anæmia. Other factors associated with poor scholarship were found to be: student completely self-supporting; employment at physical or clerical work during the summer vacation; student considers himself particularly self-conscious; student gives four or more affirmative replies relative to the emotional make-up of the individual.

An Ape Farm in Florida.

A gift from the Rockefeller Foundation has made possible the acquisition by Yale University of an ape

farm in Florida. The farm will include a special laboratory for psychobiological research and will at the same time be a source of supply of anthropoid apes for the laboratory in New Haven. It will be under the general direction of Prof. Robert M. Yerkes, who began the work on comparative psychobiology at Yale five years ago. The headquarters of research will remain at Yale and will be associated with the new Institute of Human Relations, but senior members of the staff will make frequent visits of some months' duration to the station in Florida. Observational field camps are also to be established in Africa and Malaya where the anthropoids and other primates will be studied in their natural environment.

Professional Advertisement.

Some interest has been aroused by the recent suggestion of the editor of the *Bulletin of the Chicago Medical Society* that the medical profession should use the advertisement columns of the daily papers for making known the economic and scientific problems with which they are faced. This is hailed in some quarters as a withdrawal from their traditional position. As a matter of fact, it is not at all a novel suggestion in this country. Advertising by medical societies in the lay press has already been practised in many parts of the country. It may serve not only to put the views of the local medical group in regard to social medicine but also, and perhaps better, to educate the public in regard to the possibilities of preventive medicine. Many medical men feel a quite natural reluctance to urge upon their patients such measures as the periodic health examination or the use of toxin-antitoxin knowing that they must charge a fee for such services if they are accepted. At the same time the satisfaction of doing preventive work and the consciousness of its importance make it hard to keep entirely silent and to wait for all initiative from the public. Group advertising provides the remedy.

SCOTLAND.

(FROM OUR OWN CORRESPONDENTS.)

The Edinburgh Royal Infirmary Appeal.

AT the annual meeting Lord Provost Whitson intimated that the appeal will be launched this summer. The Royal Infirmary, which boasts of never having refused an emergency case, completed its 200 years of service last year. The initiative in founding the infirmary was taken by the Royal College of Physicians, and it has developed into a splendid centre in which the Royal Colleges play a greater part than ever. Its growth is one of the romances of medicine. Last year there was a slight falling off in the ordinary income, but there was a considerable increase in the extraordinary income. While the ordinary annual income is in the region of £115,000, extraordinary income totalled nearly £140,000 last year, and there need be little fear for an institution so deeply rooted in the community. No doubt the waiting-list is still considerable, but the efforts to meet it are commensurate. The Regional Hospital Committee for the South-East of Scotland including Fife is considering the developments of the immediate future. The Edinburgh Town Council and other local authorities in the area must submit their schemes to the Department of Health before the end of March. When all these are collated and analysed we shall have the beginning of a regional hospital organisation. Misgivings in the minds of those in charge of the smaller hospitals arise mainly from the novelty of the programme; as the facts are more closely scrutinised the difficulties of adjustment will disappear. Meanwhile the infirmary is contemplating an appeal to the general public in order that the extensions over the Watson School site may proceed. It is understood that these extensions will include obstetrical and gynæcological wards, but the pressure from the public demand, both urban and rural, continues high, and it is possible that these extensions may not be adequate. There can, however, be no doubt that the South of Scotland will make the same handsome response as the North-East has done in the last three or four years to the Aberdeen appeal.

Delay in Rendering Accounts.

A claim of over £200 by a medical practitioner for professional fees has lately been dismissed in the Scottish courts. The patient died two years ago at the age of 78, and the claim covered services rendered over a period of 16 years. His executors contended that he was throughout this period a panel patient. At first, they said, the doctor treated him along with the rest of his fellow-workmen under an arrangement by which the employers accepted responsibility for the cost of treatment. Later he was an ordinary panel patient, and for the final eight years (after reaching the age of 70) he remained entitled to medical benefit without further contribution. These contentions being issues of fact accepted as established before the court of first instance, there is no more to say of them unless in the event of an appeal. No doubt there were special reasons for the delay in pressing the claim; there is no need to emphasise the disadvantage of allowing an account to run too long. A judge instinctively dislikes stale claims; the law itself has no tenderness for them. In England the Statute of Limitations peremptorily draws the line at six years unless the debtor has kept his liability alive by some form of acknowledgment or part payment. Patients themselves would be more than human if gratitude for professional services did not diminish as the past recedes in the memory. The medical profession has perhaps a special duty to be businesslike in the rendering of accounts, for by custom the patient leaves to the doctor the task of deciding what fee is reasonable and of keeping a record of visits and details of treatment. Indeed on the rare occasions when the items of the doctor's bill are challenged as excessive, it is usually because the account has been allowed to run so long that the final total surprises by its magnitude.

Greenock Auxiliary Hospital.

Greenock, a town of over 80,000 inhabitants, has added to its resources by opening at Larkfield an auxiliary hospital which cost £60,000 to build. The hospital has two wards of ten beds each for convalescent patients from Greenock Royal Infirmary. It has also —and Sir Donald McAlister commented on the importance of this—a wing of rooms with accommodation for 20 paying patients. The new hospital is situated on the north slope of the Inverkip valley in a very picturesque situation. Mr. Matthew Rankin and his sister had offered £20,000 on condition that the work was commenced within a year. Greenock is an extremely busy ship-building and shipping centre, as well as the examining station for the Clyde Port Sanitary Authority

BETHNAL GREEN POOR-LAW HOSPITAL.—Lord Monk Bretton, Chairman of the London County Council, last week opened a new operating theatre suite which has been provided at this hospital by the guardians at a cost of £7000. The theatre contains a gallery from which probationer nurses can watch the operations through a glass screen; a shower-bath has been provided for the surgeons. The old theatre had become unsuitable for the performance of nearly 1000 operations a year.

NEW DELHI HOSPITAL.—On Friday last the Viceroy of India, Lord Irwin, laid the foundation-stone of the new general hospital for New and Old Delhi. When completed the institution, which is to cost £562,000, will contain 364 beds; the first portion, to be ready in two years, will provide 254 beds. In his speech the Viceroy said that the hospital appeared to be condemned—by reason of the reluctance of Indian women to become nurses—to open with an insufficient nursing staff, and he appealed to them to contribute more of their number to the nursing profession.

Correspondence.

"Audi alteram partem."

COMPULSORY TREATMENT OF VENEREAL DISEASE: A PROTEST.

To the Editor of THE LANCET.

SIR,—The question of the compulsory treatment of venereal disease is again being raised. A conference of representatives of local authorities, held under the auspices of the British Social Hygiene Council in Glasgow on Oct. 18th, 1929, passed a unanimous resolution urging the Corporations of Edinburgh and Glasgow to continue their efforts to obtain from Parliament additional powers for the control and treatment of persons suffering from venereal disease. In the late Parliament Bills in favour of compulsory treatment were thrown out, and the reports of the principal officer show that the Ministry of Health may again oppose such legislation. It seems incredible that the advisers of the Scottish corporations should have kept them in ignorance of the important facts which have recently been added to our knowledge and which show that Parliament took the right line.

It is obvious that the V.D. campaign is not the success which was anticipated, although more people present themselves for diagnosis, no less than 34 per cent. being found on examination *not* to be suffering from venereal disease. There has been a decline in the number of patients suffering from syphilis since 1920, the peak year, but a careful examination of records from clinics in different countries shows that the curve of fall, 1920–1926, is suspiciously like the decline curve of many kinds of epidemic, and may, therefore, have no relation to treatment. Moreover, it is reported from many quarters that there has been a slight increase since 1926, although there has been no abatement, but rather an increase in the amount of treatment.

Even in 1913, the year of the International Congress in London, which might be called the apotheosis of salvarsan, the idea of a *therapia magna sterilisans* was already shaken, for combined arsenic and mercury treatment was advocated. It soon became evident that the intravenous injections were of greater immediate danger to the patient than syphilis itself, and those who had experience of mass salvarsan therapy during the war will remember that many lives were lost thereby. To avoid the grave nervous complications, and the damage to the liver and skin, it became necessary to weaken the drug and to give smaller and smaller doses. Standard courses such as are described in the recent report published by the Medical Research Council[2] consist of at least 20 doses of "914" (with either bismuth or mercury) for a sero-negative primary case, and 30 or more in a sero-positive primary, and so on, in rapidly increasing ratio.

Now, Klauder[1] has shown that repeated small doses of arsenical compounds may produce in animals arsenic-resistant spironemes, and there is good reason to believe that this obtains in man. A leading London syphilologist writing to me recently stated that he was certain that the cases of syphilis seen to-day were more refractory to treatment than those seen ten years ago. Long ago Finger pointed out the risk of converting a disease which was mainly an affection of the skin and mucous membranes into one in which the heart and great vessels and central nervous system were involved. Prof. Sarbó,[2] of Budapest, has observed that the incubation period of general paralysis has been shortened and suggests that under the influence of treatment the life-history of the spironeme is changed, and that the organisms hide up in the adventitia of the vessels and in the organs, and there multiply when the resistance of the host weakens. Even Colonel Harrison,[3] so long an adovcate of repeated injections, now says: "It may be that in giving a long series of injections we may be damaging a very necessary ally in the shape of the tissues." In fact, he has now reverted to larger spaced doses, on a principle followed by Drake and Thompson[4] at King's College Hospital for many years.

The most disquieting evidence yet produced is that of Prof. A. Warthin,[5] who, at Manchester, gave the results of a large number of post-mortems on syphilitics, who had had prolonged arsenobenzol treatment, and stated that he had seen *no single case of cured* syphilis. Most of the organs and the great vessels and heart showed active disease. Langer[6] reports an enormous increase in aortic disease from 33 per cent. in 1907 (before salvarsan) to 63 per cent. in 1915, and 83 per cent. in 1925. These observations are confirmed by Bergel and Rosenthal's[7] statistics from 70,000 autopsies. There is also evidence of uneasiness in the minds of neurologists as to the increase of general paralysis and tabes.[8 9]

On the other hand, the remarkable papers of Bruusgaard[10] and his Norwegian colleagues demand our earnest study. Here we have a careful follow-up, over many years, of a large number of patients who had been under the care of the great Cesar Boeck. Boeck held that syphilis produced its own immunity, and that the so-called specific remedies merely removed symptoms. His patients were, therefore, practically untreated. Yet the incidence of G.P.I. in Bruusgaard's long series was only 0·6 per cent. The full significance of these observations, both on the nervous system and the great vessels, must be studied in the original. In this connexion it is worthy of notice that African races, suffering from widespread syphilis, rarely show either G.P.I. or tabes, and they are almost untreated. It cannot be a different strain of spironeme for grave nervous symptoms are seen in Europeans who contract the disease from the native. Fierlinger,[11] in the League of Nations Report, doubts whether there is a real decrease in the incidence of syphilis, and whether the treatment has the value claimed for it, and states that inquiries on a large scale are being made, and hopes to have an analysis of 50,000 cases by the end of the year.

It is to be hoped that somebody will make an inquiry on Bruusgaard's lines, and it would appear to be a form of research worthy of the attention of the Medical Research Council. The investigators must obviously be independent of the clinics, and there must be an authoritative statistician. The recent report of the M.R.C. is on quite different lines and valueless for the proposed inquiry.

Lastly, I recall that just as Boeck believed in the self-cure of syphilis, my old teacher, Sir Jonathan Hutchinson, taught forty years ago that "time as well as mercury cured syphilis." Leading homœopaths have told me the same; and now, I note, that Dr. Osmond of St. Thomas's has made the same discovery, for he says "to establish a cure, time is just as important as a negative Wassermann."

I trust, therefore, that the advisers of the Scottish Corporations will restrain the worthy baillies from pressing for penal legislation, for a very good case could be made for "conscientious objection" to prolonged treatment on present lines.

I apologise for this long intrusion on your space, and hope that some competent authority may take up the question of gonorrhœa.

I am, Sir, yours faithfully,

JAMES H. SEQUEIRA, M.D., F.R.C.P. Lond., F.R.C.S. Eng.,
Consulting Physician to Skin Dept., London Hospital; late a Member of Lord Trevethin's Committee, and Chairman, Society for Prevention of Venereal Diseases.
Kenya Colony, B.E.A.

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3. Harrison, L.: Special Report Series, Med. Research Council, No. 132, p. 14.
4. Private letter from Dr. J. A. Drake.
5. Warthin, A. S.: Brit. Med. Jour., 1929, ii., 236.
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(*Continued at foot of next page.*)

INFECTIVE TONSILS AND RHEUMATISM.

To the Editor of THE LANCET.

SIR,—In their very interesting study of rheumatic disease in children, published in THE LANCET of Jan. 11th, Dr. Campbell and Dr. Warner have scarcely justified their conclusion that "complete enucleation of the tonsils is without effect in preventing the onset of rheumatism." In their Table XV. they show that the incidence of rheumatism, subsequent to tonsillectomy, in completely tonsillectomised children is the same as in non-tonsillectomised children, and that in incompletely tonsillectomised children the subsequent incidence of rheumatism is double that in either of the other two classes. Now it may be presumed that tonsillectomy, whether complete or incomplete, is performed because the tonsils are diseased, and therefore that all the children who had a tonsillar operation had diseased tonsils. Incomplete removal of diseased tonsils is tantamount to doing nothing, for the focus of infection still remains. On the showing of the authors, in their series of children with diseased tonsils, the incidence of rheumatism following incomplete tonsillectomy was double that following complete tonsillectomy. It is difficult to escape the conclusion that, in the series of cases quoted, complete tonsillectomy did reduce the incidence of rheumatism.

I am, Sir, yours faithfully,

WILLIAM W. KAY.

Medical School, The University, Manchester, Jan. 11th, 1930.

GASTRIC DEFECT IN PERNICIOUS ANÆMIA.

To the Editor of THE LANCET.

SIR,—In an interesting annotation last week (p. 92) on the Effect of Liver on Nervous Lesions of Pernicious Anæmia, you say

> "there can be no doubt of the persistence of achylia gastrica under liver treatment, and it certainly seems as though liver therapy was largely symptomatic and not directed towards the actual cause in this disease. . . . Truly radical therapy is likely to take the form of eradication of some provocative toxin . . . rather than the removal of symptoms by the use of liver."

The fact that achlorhydria persists while the patient under liver treatment maintains excellent health appears to me to point in a very different direction—namely, that achlorhydria plays no important part in the pathogenesis of pernicious anæmia and subacute-combined degeneration. The discovery of achlorhydria in these two conditions was an enormous diagnostic advance, but it advanced treatment not at all. The administration of hydrochloric acid to these patients in the last ten years has produced no demonstrable result.

I was surprised that in this article no reference was made to the interesting and relevant experiments of Castle and Townsend which were fully reviewed in a leading article in your columns three months ago. (1929, ii., 829.) These experiments went to prove that the cause of pernicious anæmia was a gastric defect which resulted in the absence of a "principle" (formed by an enzyme action of the normal gastric juice on protein) necessary for the prevention of pernicious anæmia; this principle being elaborated in every normal stomach, and even, presumably, in those many stomachs which have achlorhydria, and whose possessors do not develop pernicious anæmia. These experiments suggest to me (though not apparently to the authors) that while the gastric defect and the absence of enzymes are all-important the achlorhydria itself may play no part in the development of the disease; in which case the achlorhydria is but a side issue—a natural consequence of the gastric defect.

This uncertainty as to the influence of achlorhydria on the pathogenesis of pernicious anæmia is an excellent illustration of the problems which the biochemist is setting (or the pits he is digging) for the clinician by the multiplication of chemico-physical analyses of body fluids. An alteration in blood-calcium, blood-cholesterol, blood-sugar, blood-urea, hydrogen-ion concentration, sedimentation velocities and (save the mark) the hydration of protein particles, all propound the same question. Is it a link in the causative chain of a disease or a by-product of the morbid process? This is a problem that may occupy the physician and the biochemist for a century.

Your annotator appears to agree with D. McAlpine[1] that the evidence is against the improvement or retardation of subacute combined degeneration under liver treatment. If this is so, and the theory of Castle and Townsend is accepted, it is certain that the cause of the gastric defect in pernicious anæmia and the toxin which poisons the nerve parenchyma are identical—that is to say, the alteration in gastric secretion has no part in the development of the nervous lesions. In this case it seems to me illogical for McAlpine to insist as strongly as he does on the necessity for the administration of hydrochloric acid to these patients with subacute combined degeneration. Your annotator appears to speak somewhat disparagingly of the "removal of symptoms by the use of liver," but I regard it as first-rate substitution-therapy strictly comparable to use of insulin in diabetes. It is likely to be a long time before we are able to prevent the poisoning of the enzyme-secreting cells in the stomach or the exhaustion of the beta-cells in the islands of Langerhans. Until that day of "truly radical therapy" dawns we shall have to be content with symptomatic treatment such as liver and insulin.—I am, Sir, yours faithfully,

Derby, Jan. 12th, 1930. DOUGLAS HUBBLE.

EMPHYSEMA TREATED BY MECHANO-THERAPY.

To the Editor of THE LANCET.

SIR,—I confess that I am amazed at Dr. Kellgren-Cyriax's contention that the barrel-shaped emphysematous chest can be made permanently smaller—and to a substantial degree—by mechanical means, and that such reduction in size is capable of benefiting the patient. Further, I cannot but think that the doctor is carried away by her enthusiasm (a useful asset in its way, though sometimes dangerously misleading), in claiming to be able to restore, "in greater or less degree," the loss of pulmonary elasticity characteristic of hypertrophous emphysema, and that she is as little likely to achieve success in this as in an attempt to restore the unwelcome tell-tale loss of cutaneous elasticity (with its accompanying wrinkles) which so obstinately progresses with the flight of time.

I would remind Dr. Kellgren-Cyriax that I did not in my letter suggest that any harm would result from properly devised expiratory exercises in hypertrophous emphysema, nor that fatal asphyxia would result from them: my point was that the enlarged thorax of emphysema is compensatory, and that if the thorax of a patient, suffering from advanced hypertrophous emphysema, were reduced to the dimensions normal to that person in early adult life, he would effectually be asphyxiated.

Seeing that Dr. Kellgren-Cyriax has the opportunity of treating many cases of advanced hypertrophous emphysema, may I suggest a line of valuable clinical

[1] THE LANCET, 1929, ii., 643.

DR. SEQUEIRA: *References.*

(Continued from previous page.)

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investigation? Let careful measurements and circumferential tracings of the chest be made before and after treatment of ten successive cases of the barrel-shaped emphysematous chest, these measurements and tracings to be taken by an independent, skilled observer, who shall not know whether the patients have undergone special treatment. In order to ensure accuracy, the weight of the patient should be taken before and after treatment, and a note of the amount of adipose tissue enveloping the bony thorax. I am, Sir, yours faithfully,

Harley-street, W., Jan 12th, 1930. HARRY CAMPBELL.

MEDICAL FOUNDATIONS:

A RENEWED PLEA TO TESTATORS.

To the Editor of THE LANCET.

SIR,—About a year ago you allowed me to publish in your columns a plea that those members of the profession who are without dependents, or ha[ve] more than sufficient to provide for their dependents, should be urged when disposing of their property by will to consider the claims of the two great professional charities, the Royal Medical Foundation of Epsom College and the Royal Medical Benevolent Fund.

From certain private correspondence which ensued I have reason to believe that this plea may in time bear some fruit; but it has by no means gained sufficient acceptance, to my mind, and I ask your permission to reiterate it. Only last week the press contained particulars of the will of a Doctor of Medicine who left over £100,000 for distribution between ten charities; had he added the two I have mentioned to the list, he would have solved many difficulties for their councils, which are seriously hampered for lack of funds. Another member of our profession left £10,000 last year to charity: half to a hospital, and half to the Lifeboat Institution, if I remember rightly. Yet another left a large sum, about £50,000 I believe, to an educative foundation in the North.

There are few of us who can ever hope to distribute money to charity on this scale. But those few can do so much for their professional colleagues, through the two great medical charities, that they may surely be urged to recognise a duty in this matter superior to other claims, even when the latter include such excellent institutions as hospitals, universities, and lifeboats. I am, Sir, yours faithfully,

HENRY ROBINSON.

16, Bramham-gardens, S.W., Jan. 12th, 1930.

TREATMENT OF THE TYPHOID FEVERS.

To the Editor of THE LANCET.

SIR,—I would venture to comment on certain statements in Dr. A. E. Gow's very instructive articles in your issues of Jan. 4th and 11th. My experience of typhoid dates from the Boer War, when for a year I had charge of 90 enteric beds which were always full, convalescents being transferred at an early stage to other lines. My mortality of 30 compared favourably with that of others and to that extent supports the principles of treatment which I adopted. Dr. Gow recommends three pints of milk with additions; I consider the typical enteric stool to be the product of three pints of milk imperfectly digested. I gave a maximum of one pint of milk, supplemented by raw meat juice and white of egg with lemon juice. The chief danger of enteric is from distension and its complications; imperfect digestion is therefore very dangerous. I question whether enteric patients should not, like babies, be fed three-hourly instead of two-hourly.

I should like to see all enemas given by means of a douche can with a No. 12 catheter on its nozzle, and I have never found soap-and-water enemas with an ounce of turpentine do any harm. Talking of drug treatment, my 90 beds being arranged in rows of 30, I tried various things and found a quarter of a grain of calomel six-hourly useful in disinfecting the intestinal contents and keeping the actions regular, and I soon adopted it for all my patients. I avoided carbolic derivatives as likely to favour distension. I believe in the wet pack, one ply of sheet under a blanket laid over it. The last thing desired is to produce a sensation of cold and consequent constriction of superficial vessels. One imitates Nature by putting on a sheet wrung out of water, which feels warm to the patient and is kept wet by sponging from time to time as evaporation takes place. Four ply of sheet is half-way towards the hot pack, with the initial disadvantage of possible shock constriction from cold. Cradling at a temperature of 103° F. (speaking now as a patient) is a most uncomfortable process, while the evaporating pack is more efficacious.

On my diet I saw no cases of thrombophlebitis. It may be I produced a calcium deficiency, or that three pints of milk produce a calcium excess—my three-pint colleagues had many cases of thrombosis. I used to get cases of painful toes lasting about ten days, and these [occurred] in convalescence; perhaps the increased diet of that period caused them. I am sorry to see the statement that alcohol hardens the skin. Alcohol is serviceable as a disinfectant and to dry the skin; the really important thing the nurse does is to massage the bony areas with a smooth soapy hand, thereby maintaining the local circulation. Speaking again as a patient a bath towel made into a ring pad gives a greater sense of support than does an air cushion. A water bed gives a sense of insecurity.

I am, Sir, yours faithfully,

R. W. JAMESON.

West Wickham, Kent, Jan. 13th, 1930.

ZONDEK AND ASCHHEIM TEST FOR PREGNANCY.

To the Editor of THE LANCET.

SIR,—Further confirmation as to the practical value of the Zondek and Aschheim test for pregnancy, as described by H. Allan and F. Dickens in your issue of Jan. 4th (p. 39), is given by F. Wermbter and E. Schulze, of Berlin, in a paper published in the *Klinische Wochenschrift* (1929, viii., 970). In all their cases the presence of a hormone, held to be anterior pituitary, was demonstrated by characteristic macroscopic changes in the mouse: alteration in the œstrus (anterior pituitary reaction I.), petechiæ in the ovaries (anterior pituitary reaction II.), and corpora lutea atretica (anterior pituitary reaction III.). A brief résumé of their findings is as follows:—

—	Number.	Negative.	Positive.
Normal pregnancy.			
Fifth to sixth week ..	18	—	18
Seventh to eighth week ..	16 } 51	— } 1	16 } 50
Third to tenth month ..	17	1	16
Interrupted pregnancy.			
Fœtus died	2	—	2
Threatened abortion cured	1	—	1
Extra-uterine gestation ..	4	1	3
Puerperium.			
After normal birth ..	1	1	—
After extra-uterine gestation	1	1	—
After or during abortion..	9	7	2
No pregnancy.			
Amenorrhœa	8	8	—
Retroflexion of uterus, adnexitis	32	31	1

Total: 109 cases, including 2 failures.

Thus, out of 51 normal pregnancies, 50 gave a positive reaction, among which 18 were between the fifth and sixth week. In one woman the urine gave a negative reaction on the thirty-fourth and the fortieth day of pregnancy, but was positive on the

forty-sixth. Of the 17 cases in the third to the tenth month, the negative reaction occurred in the ninth month, one week before the birth of a living child—a failure of no practical significance. The negative reaction in one of the four cases of extra-uterine reaction gestation occurred where bleeding had been in progress for five weeks, and operation subsequently revealed a hæmatocele.

In 40 non-pregnant patients tested, the reaction only failed once; where a left-sided inflammatory adnexal tumour was present—in all probability an extra-uterine pregnancy.

I am, Sir, yours faithfully,

GEORGE H. MORRISON, M.B., Ch.B. Edin.

London, S.W., Jan. 8th, 1930.

PROGRESS IN UROLOGY.

To the Editor of THE LANCET.

SIR,—If Mr. Morson reads my paper carefully he will see that I was referring particularly to the work done in Dr. Young's clinic at Baltimore. He will also see that I did not confine my remarks to emanation seeds, but included radium element in small needles. It was not possible in a short account to give details, but the method of treatment under discussion does not entail the retention of the emanation seeds, which are provided with short threads by means of which they can be removed when they have served their purpose. The production of a vesico-vaginal fistula must surely be due to involvement of the vaginal wall by the growth or faulty application of the radium. The good results obtained by Young and his co-workers are there for all to see who have time and inclination to visit his clinic.

I am, Sir, yours faithfully,

Belfast, Jan. 13th, 1930. ANDREW FULLERTON.

COMPLICATIONS OF OPERATIONS FOR PILES.

To the Editor of THE LANCET.

SIR,—In reply to Mr. Morley's letter in your issue of Jan. 4th (p. 53) regarding the report of the last meeting of the Subsection of Proctology of the Royal Society of Medicine, it is true, I believe, that I was the only speaker who referred to the injection method, but Mr. Morley should realise that the subject of Complications of Operations for Piles had been arranged for the discussion, and it was hardly the place therefore for labouring the merits of the injection treatment. I quite agree with the contention that uncomplicated internal piles can be cured by injection, and I am an enthusiastic believer in ambulatory treatment of many rectal conditions. There is, however, a certain small proportion of pile cases that has to submit to operation—namely, the enormous prolapsing piles, fibrous internal piles or piles complicated by the presence of a deep fissure, large external piles or some other lesion. The subject in question, therefore, was a very proper one for a discussion, even though the report has provided Mr. Morley with "a text for the advocates of injection."

Mr. Morley's benevolent welcome of me as a convert to the injection method is somewhat overdue seeing that I have been practising and teaching this method for the last ten years. The teaching has not been in writing, however, but practical clinical teaching carried out regularly at St. Mark's Hospital to post-graduates from all parts of the world. The out-patient clinics at St. Mark's Hospital provide, I venture to say, a wealth of clinical material in rectal work that is unsurpassed in this country, and for many months now I have used the 5 per cent. solution of phenol in vegetable oil by the method of Albright and Blanchard of which Mr. Morley is himself a follower. The results have been so good that I have to recommend operation now in only a very small proportion of the total number of pile cases seen.

As regards Mr. Morley's criticism of the syringe and needle which I have recently described, I must confess that I am not impressed by his unfavourable view of it. In his original article (THE LANCET, 1928, i., 543) Mr. Morley advocates injection of "a large quantity (some 1 to 3 c.cm.)," and in his work entitled "Hæmorrhoids," fourth edition, 1929, he is still more modest, saying (p. 107), "it will usually be found that each pile requires from ½ to 1½ c.cm. of the oil to produce the requisite degree of distension." Again, the needle which Mr. Morley has described and advocated is only 4¾ in. long, which, when used with a larger syringe, gives very little more effective length than the one I have suggested. Therefore I regard his latest pronouncement of 10 c.cm. dosage per puncture and a 7 in. needle as a straining for a dramatic effect which bears little relation to everyday work. It is the man behind the syringe that counts, and one syringe and needle may be as good as another.

Mr. Morley may be glad to learn that I still have a couple of his needles in routine use at St. Mark's. The syringe that I have described is effective in practice and enables one to inject the solution sufficiently high and in adequate amounts. I have had no need to inject more than 3 c.cm. per puncture, and the syringe is easily refilled when more than a total of 3 c.cm. is required for any particular case. The bayonet fitting for the needle and its wide bore are the essential points which can obviously be adapted, if required, to larger syringes and to needles of any conceivable length and shape.

I am, Sir, yours faithfully,

London, W., Jan. 13th, 1930. W. B. GABRIEL.

THE BRUIT D'AIRAIN.

To the Editor of THE LANCET.

SIR,—Questions of meaning and translation are always interesting, but their solution has a methodological importance. The best way to set about it seems to be to work back from the words to the notions symbolised, and then to the "things" thought about. Now, if Dr. McLaughlin really wishes to cross swords with "Anglo-Gallicus," and *glaives d'airain* are nominated by their seconds, the weapons produced at the *triste rendezvous* in Hyde Park will certainly be Bronze Age relics, made of the predominantly copper and tin alloy that we call bronze nowadays—it was not always called thus, in England. Swords made of the copper and zinc alloy which alone is now called brass will not serve their turn. On the other hand, it is possible that they may be dissuaded from their fell purpose on listening to the harmonious *tintement* from the Lansbury Tower. I say this, because I am told that each bell (or, as a poetical Frenchman might say, *chaque airain*) has been cast in this copper and tin alloy we call bronze. If I am wrong, and these bells are really cast in brass, then, of course, the discord on the grass will be aggravated by the jangling in the air. And the whole evening will end on a "brassy note" very unlike that of any pneumothorax I have ever percussed. But I subscribe myself, very hopefully yours,

Jan. 11th, 1930. GALLO-BRITANNICUS.

To the Editor of THE LANCET.

SIR,—"Anglo-Gallicus" tells us that the name of Laennec should be spelt thus, without vowel-ligature or diæresis, just as are the place-names Caen, Laon, and the like. So the owner of the name wrote it, and so it appears on his statue in his native place of Quimper, Lower Brittany. But it has been the practice for 80 years or more at all events to place two dots over the third letter in order, no doubt, to acquaint the non-gallic reader how the name should be pronounced, and the practice is now so deeply ingrained that it may be well to continue it. Laënnec on this view is the anglicised form of Laennec. "Anglo-Gallicus" does not seem to be aware that Laennec is trisyllabic, whereas Caen and Laon are

monosyllabic; current French dictionaries of proper names are quite clear on this. My own copy of Larousse Classique Illustré not only indicates the trisyllabic pronunciation of the name, but puts a diæresis over the first e to ensure it.

I am, Sir, yours faithfully,

Jan. 11th, 1930. BOBO.

LIABILITY TO DAMAGES FOR INFECTION.

To the Editor of THE LANCET.

SIR,—Actions of damages against a medical man are not infrequent nowadays, but a recent decision of the Scots courts seems to break new ground (Carmichael *v.* Miller's Exrs., Dec. 26th, 1929). A paterfamilias claimed £600 from the doctor in charge of the local hospital for causing the death of his daughter by negligently discharging his son while suffering from diphtheria. It was said that there had been carelessness, firstly in failing to recognise a certain development in the course of scarlet fever as incipient diphtheria, and also in any event in sending home a child with an infectious discharge from the ear. The defender was successful on both issues, for the judge held that he had no reason to diagnose diphtheria or to suspect danger from the ear condition. But though he escaped on the facts important legal questions were assumed against him.

It seems never to have been decided hitherto that a medical man was liable to be sued by any third party who might be indirectly affected by his actions. It was always obvious, of course, that he was morally bound to guard the general public against infection, but the existence of a legal duty is a different matter. One might naturally think that his only legal obligation was to his patient or to the person who employed him. This case did not, of course, depend in any way on the tie of blood between the members of the family affected. If a sister has a claim, so has any stranger. The only difference is a practical one that it would be much harder for him to prove the exact source of his infection. It was a pure accident also that it was a relative of both who sued, for the father was a mere figurehead to enable his infant daughter to appear in the Law Courts. The result of it all is that if a doctor by some oversight allows an infected patient to come in contact with others he may be liable in damages to an almost unlimited extent. This is surely a new and startling proposition.

Even without this added burden one must remember that the medical practitioner is badly handicapped in contrast with other professional men. Lawyers, architects, and so forth are not liable to anyone except the person who employs them, because the law does not recognise any duty apart from contract. If a father calls in a solicitor to make his will a child has no redress should his name be carelessly omitted. But if a surgeon sews up a sponge inside him things are quite different. The reason for this unfair distinction is that the law regards physical injury much more jealously than monetary loss. Medical men are thus penalised by the accident that their actions affect persons rather than pockets. The real remedy is, perhaps, not to reduce the liability of doctors but to impose the same standard on other professions.

If the new idea catches on, a rich vein of damages may be opened to a certain section of the legal fraternity. Defenders, however, will always have the advantage as regards the facts. It is, as a rule, difficult to prove that infection has been incurred from any particular source. In this case the difficulty was all but surmounted by special circumstances, and the proof only broke down because no virulent bacilli had been detected in the ear. The family were all young, lived in a small town in the Highlands, and were much at home. Another child also took diphtheria, and no other cause could be suggested, the evidence as to the drains being negative. This was unfortunate, as it may result in future claimants underestimating the obstacles to be surmounted, and in medical men being forced to incur considerable legal costs. One can only hope that these actions will not become as common as those directed against physicians who have reluctantly performed the odious duty of certifying a person as insane.

I am, Sir, yours faithfully,

Jan. 11th, 1930. LEX.

*** This letter is the subject of comment under Medicine and the Law.—ED. L.

PSITTACOSIS.

To the Editor of THE LANCET.

SIR,—An investigation on psittacosis is at present being carried out at the London Hospital and I should be grateful if any doctor who has had to deal recently with a case of the disease would communicate with me. I should also be glad if any parrot suspected of conveying the disease could be sent to Dr. Western, Bacteriological Department, London Hospital, E. 1.

I am, Sir, yours faithfully,

ROBERT HUTCHISON.

Devonshire-place, W., Jan. 14th, 1930.

Obituary.

JAMES HOGG MARTIN, M.D., F.R.F.P.S.GLASG.,

PROFESSOR OF MIDWIFERY AND GYNÆCOLOGY, ANDERSON COLLEGE, GLASGOW.

THE death on Jan. 1st of Prof. James Hogg Martin startled a wide circle of friends and patients, for only his most intimate associates were aware of the serious nature of his illness, and they had the hope that, though there might be little prospect of his taking part again in professional life, he might yet enjoy a period of moderate health.

DR. MARTIN.

To Prof. Archibald Young, an intimate friend of the late Prof. Martin, we owe the following estimate of the man and his work: "Martin was in many ways a remarkable man—" he writes, from a knowledge extending as far back as their school-days, when they were both pupils of the Glasgow High School, and members of the same form. "He was one of a large family of boys and girls. His older brother and his next younger brother, also high school boys, went direct from school to college, both graduating in medicine with distinction. The older has been for a number of years visiting surgeon to the Cardiff Infirmary; the younger's professional career has also been laid in Cardiff. James, on the other hand, went into business for some years after leaving school, but when already 30 years of age, he also became a student of medicine, graduating in medicine at Glasgow University in 1907. During his student days he began to take part in teaching, acting for two years as a student demonstrator in anatomy

under the late Prof. Cleland. After graduation, he served the usual terms as house surgeon and as house physician in the Western Infirmary, Glasgow, with Sir George Beatson and Dr. William MacLennan respectively, and thereafter, for two years, acted as clinical assistant to Dr. MacLennan. His inclination, however, was from the first towards the study and practice of midwifery and gynæcology. As a student he had distinguished himself in both subjects, while he also attended practice at the Rotunda Hospital, Dublin, and the Jessop Hospital for Women, Sheffield. Shortly after graduation he became house surgeon at the Royal Maternity Hospital, Glasgow, later one of the assistants to the hospital, and finally visiting surgeon, an office which he held up to the time of the illness which ultimately proved fatal. In 1912 he became out-patient gynæcologist at the Western Infirmary, Glasgow, and worked there almost to the end of his professional life. He was chiefly responsible for the establishment, and the carrying on for a good many years of the work of the Antenatal Dispensary of the Royal Maternity Hospital, Glasgow, and during the last ten years of his life he was the sole obstetric surgeon to the three district hospitals under the Glasgow Parish Council. Martin thus lived a full and busy life. The demands of his several hospital appointments were onerous and severe, but he found time for the active teaching both of students and of nurses. He conducted the class of midwifery at St. Mungo's College, Glasgow, for two years during the absence through illness of Prof. Jardine, and from the year 1922, when he was appointed professor of midwifery and gynæcology at the Anderson College of Medicine, he continued with great success to instruct large numbers of students, his courses at the Anderson College being recognised for qualification purposes by the University of Glasgow, as well as by the Royal Faculty of Physicians and Surgeons. He taught clinical obstetrics to large numbers at the Royal Maternity Hospital, and took part in post-graduate teaching.

"His teaching was simple and more or less dogmatic: it was without frills but thoughtful, and much of it was supported by personal observation, for he was able to turn to account in this way his large and carefully digested clinical experience especially as an obstetrician. His contributions to medical literature were few, but a paper read before the Royal Medico-Chirurgical Society of Glasgow in 1921, entitled Fifty Consecutive Cæsarean Operations without Fatality, attracted considerable attention, for he described original modifications in the technique of the operation and of the immediate after-treatment."

Prof. Young concludes with a testimony to the personal qualities of Martin as a colleague and friend, writing eloquently of the honesty and unremitting industry which won for him a notable place in the professional life of Glasgow: "One cannot bring these notes to a close," he adds, "without paying tribute to the support which Martin received in his happy marriage which took place some 16 years ago. To his wife, who survives him, and who did so much to encourage him during his earlier struggles as well as to be his stay and comfort during his long illness, sincere sympathy goes out."

Medical News.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—At a meeting of the Council on Jan. 9th, with Lord Moynihan, the President, in the chair, diplomas of membership were granted to Rosa E. Chamings (Royal Free), B. S. Cornell (Toronto), A. N. Duggal (Punjab and Guy's), A. H. Gurney (Cambridge and St. Bartholomew's), and H. P. Nelson (Durham).—The Hallett Prize was awarded to H. J. B. Atkins (Oxford and Guy's) on the result of the recent examination in anatomy and physiology for the Fellowship.—Mr. R. H. Burne, the Physiological Curator, was appointed Acting Conservator of the Museum during Sir Arthur Keith's absence on a visit to Egypt.—Arnott Demonstrations will be given by Mr. T. B. Layton on March 7th and by Sir Frank Colyer on March 14th and 21st.

UNIVERSITY OF LONDON.—Prof. R. J. S. McDowall will give four lectures, on the Control of the Circulation, at King's College, Strand, W.C., on Thursdays, Jan. 30th, and Feb. 6th, 13th, and 20th, at 5 P.M. Ten lectures on Comparative Physiology will be given by Mr. G. P. Wells at University College, Gower-street, W.C., at 5 P.M., on Fridays from Jan. 17th to March 21st. A course of post-graduate lectures on biochemistry is in progress at the College.

UNIVERSITY OF LIVERPOOL.—At recent examination the following candidates were successful:—

DIPLOMA IN PUBLIC HEALTH.

I. S. Jones, J. C. McFarland, and E. Miles.

LONDON CLINICAL SOCIETY.—At a meeting of this Society on Tuesday, Jan. 28th, Dr. Arthur Hurst and Mr. H. S. Souttar will open a discussion on the Treatment of Gastric Ulcer. The meeting will be at 8.45 P.M. at the London Temperance Hospital, Hampstead-road, and all medical practitioners are invited.

THE 83RD (DUBLIN) GENERAL HOSPITAL.—The annual dinner of this Dublin unit which staffed the 83rd Hospital at Boulogne in 1917–18 was held last Saturday in the Royal College of Surgeons, Dublin, with Sir William Taylor, organiser of the unit, in the chair. Some 15 members of the original group of 29 sat down to dinner. In the 11¼ years that have passed since the unit returned from France six members have died, all of them surgeons, the latest to go being Prof. T. E. Gordon, who died last July.

Medical Diary.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

TUESDAY, Jan. 21st.—5.30 P.M. GENERAL MEETING OF FELLOWS. Ballot for election to the Fellowship. 8 P.M., PATHOLOGY.

WEDNESDAY.—5 P.M., COMPARATIVE MEDICINE. SURGERY. Special discussion on Actinomycosis Common to Man and Animals. Openers: Dr. Leonard Colebrook (Comparative Medicine), Mr. V. Zachary Cope (Surgery). Speakers: Mr. T. J. Bosworth, and others.

THURSDAY.—8.30 P.M., UROLOGY. Paper: Mr. A. Clifford Morson: The Pathology and Treatment of Carcinoma of the Penis.

FRIDAY.—8 P.M., EPIDEMIOLOGY. Paper. Dr. G. P. Crowden: Industrial Efficiency and Fatigue.

MEDICO-LEGAL SOCIETY.

THURSDAY, Jan. 23rd.—8.30 P.M., Dr. L. A. Weatherly: Yesterday and To-day in our Courts of Law—A Half Century's Experience and Opinion of a Medical Witness.

CHELSEA CLINICAL SOCIETY.

TUESDAY, Jan. 21st.—7.30 P.M., Dinner at the Hotel Rembrandt, Thurloe-place, S.W., followed by a discussion on Sweating. Openers: Dr. C. E. Sundell and Dr. H. MacCormac.

ROYAL INSTITUTION, 21, Albemarle-street, W.

THURSDAY, Jan. 23rd.—5.15 P.M., Dr. H. A. Harris: Growth of Children in Health and Disease.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, Jan. 20th, to SATURDAY, Jan. 25th.—MEDICAL SOCIETY OF LONDON, 11, Chandos-street, Cavendish-square, W. Tues. at 4 P.M., Lecture by Mr. Geoffrey Keynes: The Present Position of the Radium Treatment of Carcinoma. No fee.—ST. MARY'S HOSPITAL, Paddington, W. Thurs., 11 A.M., Special Demonstration by Mr. Zachary Cope. No fee.—HOSPITAL FOR DISEASES OF THE SKIN, Blackfriars-road, S.E. Fri., 6 P.M., Clinical demonstration by Dr. W. B. Winton. No fee.—QUEEN'S HOSPITAL FOR CHILDREN, Hackney-road, E. Special Course, second week. All day course.—Further particulars from the Fellowship of Medicine.

NORTH-EAST LONDON POST-GRADUATE COLLEGE. Prince of Wales's General Hospital, Tottenham, N.

MONDAY, Jan. 20th.—2.30 to 5 P.M.: Medical, Surgical, and Gynæcological Clinics. Operations.

TUESDAY.—2.30 to 5 P.M.: Medical, Surgical, Ear, Nose and Throat Clinics. Operations.

WEDNESDAY.—2.30 to 5 P.M.: Medical, Skin, and Eye Clinics. Operations.

THURSDAY.—11.30 A.M.: Dental Clinics. 2.30 to 5 P.M.: Medical, Surgical, Nose, Throat and Ear Clinics. Operations.

FRIDAY.—10.30 A.M.: Throat, Nose and Ear Clinics. 2.30 to 5 P.M.: Surgical, Medical, and Children's Diseases. Clinics. Operations.

KING'S COLLEGE HOSPITAL MEDICAL SCHOOL, Denmark Hill, S.E.

THURSDAY, Jan. 23rd.—9 P.M., Mr. J. B. Hunter: Surgical Aspect of Goitre.

ROYAL NORTHERN HOSPITAL, Holloway.

TUESDAY, Jan. 21st.—3.15 P.M., Mr. J. B. Hunter: Carcinoma of the Colon.

WEST LONDON HOSPITAL POST-GRADUATE COLLEGE, Hammersmith, W.
MONDAY, Jan. 20th.—10 A.M., Dr. Dowling: Skin Department. 11 A.M., Mr. Tyrrell Gray: Surgical Wards. 2 P.M., Mr. Sinclair: Surgical Wards.
TUESDAY.—10 A.M., Medical Registrar: Medical Wards. 2 P.M., Mr. Hamblen Thomas: Throat, Nose, and Ear Dept. 2.30 P.M., Sir Henry Simson: Gynæcological Operations.
WEDNESDAY.—10 A.M., Dr. Burnford: Medical Wards. 2.30 P.M., Mr. Donald Armour: Surgical Wards. Dr. Scott Pinchin: Medical Out-patients.
THURSDAY.—11.30 A.M., Mr. Simmonds: Demonstration of Fractures. 2 P.M., Mr. Bishop Harman: Eye Department. 2 P.M., Mr. MacDonald: Genito-Urinary Department.
FRIDAY.—10 A.M., Dr. Pritchard: Medical Wards. 2 P.M., Mr. Vlasto: Throat, Nose, and Ear Department, 2 P.M., Mr. Sinclair: Operations.
SATURDAY.—9 A.M., Mr. Vlasto: Throat, Nose, and Ear Operations. 9.30 A.M., Dr. Burnford: Bacterial Therapy Department. 10 A.M., Dr. Owen: Medical Children's Department.
Daily, 10 A.M. to 5 P.M., Medical, Surgical and Special Out-patients, Operations, Ward Visits, Anæsthetic Courses.

CENTRAL LONDON THROAT, NOSE, AND EAR HOSPITAL.
FRIDAY, Jan. 24th.—4 P.M., Mr. A. Lowndes Yates: The Treatment of Intractable Discharge from the Nasal Sinus.

LONDON SCHOOL OF DERMATOLOGY, St. John's Hospital, 49, Leicester-square, W.C.
TUESDAY, Jan. 21st.—5 P.M., Dr. J. E. M. Wigley: Erythema Multiforme.
THURSDAY.—5 P.M., Dr. J. M. H. MacLeod: Ringworm Infections.

ST. JOHN'S HOSPITAL DERMATOLOGICAL SOCIETY, 49, Leicester-square, W.C.
WEDNESDAY, Jan. 22nd.—4.15 P.M., Clinical Cases. Tea at 4 P.M.

UNIVERSITY COLLEGE, Gower-street, W.C.
MONDAY, Jan. 20th.—5 P.M., Prof. A. V. Hill: Oxygen and the Recovery Process in Muscle and Nerve.

ST. MARY'S HOSPITALS, Manchester.
FRIDAY, Jan. 24th.—4.30 P.M., Post-graduate Lecture (at the Whitworth-street West Branch), Dr. C. P. Lapage: Meningitis and Encephalitis.

GLASGOW POST-GRADUATE MEDICAL ASSOCIATION.
WEDNESDAY, Jan. 22nd.—4.15 P.M. (at the Western Infirmary), Prof. T. K. Monro: Medical Cases.

Appointments.

PYKE, H., M.B., Ch.B. Bristol, has been appointed Senior Resident Officer at the South Devon and East Cornwall Hospital.
WILLIAMSON, A. B., M.D., Ch.B. Edin., D.P.H., Assistant Medical Officer of Health for Leeds.
WESTMINSTER HOSPITAL MEDICAL SCHOOL: KOKIA, M., L.R.C.P. Lond., M.R.C.S., and MACHRAY, R., L.R.C.P. Lond., M.R.C.S., Resident House Physicians. HACKETT, V., L.R.C.P. Lond., M.R.C.S., and BUCK, G. H., L.R.C.P. Lond., M.R.C.S., Resident House Surgeons.

Vacancies.

For further information refer to the advertisement columns.

Ashton-under-Lyne District Infirmary.—H.S. At rate of £150.
Barnsley, Beckett Hospital and Dispensary.—Jun. H.S. At rate of £140.
Barnstaple, North Devon Infirmary.—Res. M.O. At rate of £150.
Beverley, Yorkshire, East Riding Mental Hospital.—Jun. Asst. M.O. £250.
Birmingham, Ear and Throat Hospital.—H.S. Also Second H.S. Each £150.
Birmingham, General Hospital.—Res. H.P. £70.
Bolton, Townleys Hospital, Farnworth.—2nd Asst. M.O. £225.
Bradford Royal Infirmary.—Two H.S.'s. Each at rate of £150.
Bristol General Hospital.—Sen. Res. M.O. £200.
Burnley, Victoria Hospital.—H.S. At rate of £125.
Cardiff Royal Infirmary.—Three H.S.'s. and Three H.P.'s. Each at rate of £50.
Carlisle City.—M.O.H. and School M.O. £900.
Central London Ophthalmic Hospital, Judd-street, W.C.—Asst. S.
Chester City.—Asst. M.O.H. and Asst. School M.O. £600.
Chester Royal Infirmary.—H.P. £150.
City of London Hospital for Diseases of the Heart and Lungs, Victoria Park, E.—H.P. At rate of £100.
Coventry and Warwickshire Hospital.—Res. Asst. H.S. £125.
Coventry City.—Asst. School M.O. and Asst. M.O.H. £600.
Eastbourne, Princess Alice Memorial Hospital.—H.S. Also Jun. H.S. At rate of £125 and £100 respectively.
East London Hospital for Children and Dispensary for Women, Shadwell, E.—Surgeon to Nose, Throat, and Ear Dept.
Essex County Council County Sanatorium, Black Notley, near Braintree.—Res. M.O. £750.
Evelina Hospital for Children, Southwark, S.E.—H.P. At rate of £120.
Exeter Royal Devon and Exeter Hospital.—H.S. At rate of £150.
Greenwich Metropolitan Borough.—M.O. for Infant Consultation. Centre. 1½ gns. per session.
Guildford, Royal Surrey County Hospital.—Res. Med. and Surg. O. and Reg. £250.
Hemel Hempstead, West Herts Hospital.—Sen. Res. M.O. Also Jun. Res. M.O. £150 and £100 respectively.
Huddersfield Royal Infirmary.—H.S. £150.
Ilford Emergency Hospital.—Second H.S. £100.
Inverness, Northern Infirmary.—Jun. Medical Resident. At rate of £100.
Ipswich, East Suffolk and Ipswich Hospital.—Cas. O. £150. Also First H.S. At rate of £120.
Leeds University.—Demonstrator in Pathology and Bacteriology. £300.
Leicester City Isolation Hospital and Sanatorium.—Res. M.O. £300.
Liverpool Eye and Ear Infirmary.—H.S. to Ear, Nose, and Throat Dept. £100.
Macclesfield General Infirmary.—Res. H.S. £180.
Manchester, Ancoats Hospital.—Res. M.O. £150. Also Asst. Pathologist. £350.
Manor House Hospital, Golders Green, N.W.—H.S. At rate of £200.
Metropolitan Hospital, Kingsland-road, E.—Ophth. Surg. Also Asst. Surg. in Dept. for Dis. of Women.
National Hospital, Queen-square, W.C.—Hon. Dental Surgeon.
National Hospital for Diseases of the Heart, Westmoreland-street, W.—Hon. Physician to Out-patients.
Newark General Hospital.—Res. H.S. At rate of £150.
Rochdale Infirmary and Dispensary.—Jun. H.S. £175.
Royal Army Medical Corps.—Commissions.
St. Bartholomew's Hospital, E.C.—Asst. Physician.
St. John's Hospital, Lewisham, S.E.—Res. Cas. O. At rate of £100.
St. Mark's Hospital for Cancer, &c., City-road, E.C.—H.S. At rate of £75.
St. Mary's Hospital, W.—Second Asst. Pathologist. £250.
St. Thomas's Hospital Medical School, S.E.—Lecturer in Physiology. £500.
Salisbury General Infirmary.—H.P. £150.
Scotland Health Department.—M.O. £600.
Sheffield Royal Hospital.—Vacancies on Res. Staff. Each at rate of £80.
Sheffield Royal Infirmary.—H.S., Ophth. H.S., Asst. Ophth. H.S. Also Asst. Cas. O. Each at rate of £80.
Stafford, Staffordshire General Infirmary.—H.P. At rate of £150.
Stroud, Glos., Stroud General Hospital.—H.S. At rate of £150.
Surrey County Council.—Asst. M.O. £600.
Swindon and North Wilts Victoria Hospital.—H.S. At rate of £100.
Taunton, Taunton and Somerset Hospital.—Jun. House M.O. At rate of £100.
West London Hospital, Hammersmith-road, W.—Two Hon. Anæsthetists.
West Sussex County Council and Bognor Regis U.D.C.—Asst. County and District M.O.H. £700.
Wrexham and East Denbighshire War Memorial Hospital.—Hon. Asst. P. and S.

The Chief Inspector of Factories announces the following vacant appointments for Certifying Factory Surgeons: Cupar (Fife), Hythe (Kent), Uxbridge (Middlesex), Penryn (Cornwall), Crowborough (Sussex), and Sutton Bridge (Lincs.).

The Home Secretary is considering the appointment of a Medical Referee under the Workmen's Compensation Act, for the districts of the Congleton and Sandbach; and Macclesfield County Courts (Circuit No. 10). Application should reach the Private Secretary, Home Office, Whitehall, S.W.1, not later than Feb. 1st. The Home Secretary also proposes to appoint an additional Specialist Medical Referee under the Workmen's Compensation Act, for Ophthalmic cases arising in the Districts of the Bradford, Keighley, Skipton, and Settle, Halifax, and Huddersfield County Courts (Circuit No. 12). Applications are invited from practitioners resident at Bradford, and should reach the Private Secretary, not later than Feb. 1st.

The Home Secretary gives notice that, in consequence of the resignation of Dr. E. D. Bower, of Gloucester, one of the Medical Referees under the Workmen's Compensation Act for the Districts of the Cheltenham, Cirencester, Dursley, Gloucester, Newent, Newnham, Northleach, Ross, Stow-on-the-Wold, Stroud, Tewkesbury, Thornbury, and Winchcomb County Courts (Circuit No. 53), the appointment held by him is vacant. Applications for the post should be addressed to the Private Secretary, and should reach him not later than Feb. 5th.

Births, Marriages, and Deaths.

BIRTHS.

ECCLES.—On Jan. 7th, at a nursing home at Hove, the wife of Dr. Karslake Eccles, of a son.
ELKINGTON.—On Jan. 10th, at Stockwell House, Bruton, the wife of Dr. Guy Elkington, of a daughter.

DEATHS.

DALE.—On Jan. 13th, suddenly, at Craven House, Marine-parade, Worthing, Benjamin Hague Dale, M.R.C.S., L.R.C.P.
MASON-MACFARLANE.—On Jan. 7th, at Turin, Angus, Scotland, of heart failure, David James Mason-MacFarlane, C.M.G., C.B.E., T.D., M.D., J.P., aged 67.
SHAW.—On Jan. 9th, at Wokingham, George Shaw, M.D.
SLEIGH.—On Jan. 6th, at a nursing home, Henry Paterson Sleigh, M.B., Ch.B., of Holbrook, Ipswich, aged 56.
SMITH.—On Jan. 9th, suddenly, John Howie Smith, M.B., C.M., of Kennerley-road, and Greek-street, Stockport, aged 62 years.

N.B.—A fee of 7s 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Comments, and Abstracts.

CARDIAC INSUFFICIENCY:

THE PRECURSOR OF CARDIAC FAILURE.*

BY G. J. LANGLEY, M.B.E., M.D., M.R.C.P. LOND.,

PHYSICIAN TO ANCOATS HOSPITAL, MANCHESTER, AND TO THE SALFORD ROYAL HOSPITAL.

CARDIAC insufficiency in everyday life probably amounts to shortness of breath or some precordial distress on effort, and is essentially a relative matter. We can all reach such a stage of cardiac insufficiency by over-exertion—e.g., running a half-mile race. In the first place, therefore, we must determine how much effort is required to induce such symptoms. The child can rush and tear about all day long and feel none the worse, while the aged puff and blow on very slight effort. In fact, cardiac sufficiency is merely a measure of physical fitness. The marathon runner only shows these signs after great exertion; the centenarian only avoids them by continual rest in bed. The broken-down heart presents both these signs all the time; it has no cardiac sufficiency at all.

Relative cardiac insufficiency arises when the circulation is unable to fulfil such demands as may reasonably be imposed upon it, having due regard to age, habit, and environment.

(*a*) *Age.*—The physical reserve diminishes as age advances. Football is a good game at 20, hard work at 30, and impossible at 40.

(*b*) *Habit.*—Dock labourers at 40 can endure physical exertion impossible to the cleric, barrister, and physician of the same age.

(*c*) *Environment.*—Vitiated atmosphere, adverse temperature, and unsuitable food all affect cardiac reserve. It is customary to refer such insufficiency to the heart.

The analogy of the circulation to the water-supply of a great city is always irresistible to me. We have heard much in the public press this year about London's water-supply, for it threatened to run short. Our water-supply, primarily derived from the rainfall, is collected into reservoirs and pumped through the supply pipes to each individual house, where it is used for cleansing in one way or another. Every house in London is supplied with water through a pipe. This provision does not necessarily keep the population any cleaner; they must themselves make use of the water in the proper way, exactly as the individual tissues must use their blood-supply in the proper way. When the rainfall fails the supply of water fails, and the best pump in the world cannot feed the pipes with water it has not got. Continuing the analogy, the output of the heart must be determined by its intake, a curtailment of which will cause the best heart in the world to fail. When the water pipes become old they suffer from two defects; (*a*) silting up, so that their bore is much reduced; and (*b*) a liability to burst, especially under stress. If the pump becomes defective and its valves leak, either the supply of water is curtailed or the pump must work harder and faster to maintain the supply. This simple analogy, therefore, offers four possibilities to explain an insufficiency of water-supply or blood-supply, the degree of deficiency being proportionate to the degree of the primary defect.

The Pump.

In considering the pump itself our analogy breaks down to some extent; it is obvious enough that if the pump be worn out and defective, or its valves become broken, damaged or actually destroyed, the pump cannot do its job and the water-supply fails. In this, of course, it exactly resembles the heart, but in the human body there is only one pump, which must do the work adequately for every demand made upon it. When an individual is lying in bed and asleep the demands upon his heart-pump are at a minimum, whereas when strenuous physical exertion is undertaken the demands upon the heart are enormously increased. The difference between the maximum and the minimum response can be regarded as the cardiac reserve. Relative cardiac insufficiency, therefore, is a diminution in cardiac reserve. This reserve power of the heart is best considered in terms of minute volume—i.e., the quantity of blood ejected by the heart per minute. This volume may be increased in two ways: (1) by increasing the frequency of the heart beat; and (2) by increasing the volume of blood thrown out per beat. The first of these is very easily observed; the second in man can only be arrived at indirectly.

Some estimate of the reserve capacity of the heart can be attained by observing in any individual the rise of pulse-rate which occurs in response to a standard exercise done at a standard speed. It is then found that the actual rise in frequency seems to be a measure of physical fitness. As a concrete example, a well-trained athlete will swing up and down touching the toes 20 times in 40 seconds, and show a pulse rise of 60 to 70 beats per minute, whereas an individual out of condition doing the same exercise in the same time will show a rise from 70 to 120 beats per minute. It is probable that the maximum frequency of the normal heart is 160 beats per minute, so that the reserve power remaining to the two individuals after the exercise is enormously different, and would become vastly more marked if the test exercise were more severe. Response to effort is, after all, the keynote of cardiac efficiency; in complete heart failure no effort is possible; the patient suffers a severe degree of distress even when kept completely at rest in bed and is unable to make even the slightest effort unassisted. His cardiac reserve is nil. At the other extreme the winner of a marathon race is endowed with a cardiac reserve beyond that of his fellows which reaches, of course, a very high order.

But the efficiency of the heart as a pump cannot be measured solely in terms of change of speed. There is another factor, the change in stroke-volume, and it is in this respect that the heart is so unlike the water-pump which formed our original simile. The volume of the blood ejected at each cardiac contracture can, and does, vary within wide limits.

Until a few years ago every text-book of physiology quoted Bowditch's law of the heart: that upon electrical stimulation the heart muscle responded either with the full force of which it was capable, or not at all—the "all or nothing" law. The brilliant researches of A. V. Hill have upset all our previous ideas of muscular contracture, and everyone now knows that the force of a muscular contraction is a function of its fibre length up to a critical destruction point. If we may apply that principle to the heart muscle, the force of its contracture will be determinated by the length of its muscle-fibres at the moment. Any lengthening of the cardiac muscle-fibre must, and will, result in an increase in the capacity of the chamber concerned, which will therefore hold more blood. It is important, of course, to bear in mind that muscle has no power of active relaxation and can exert no relaxation force, so that no question of suction in a muscular chamber can arise. There must, therefore, be some force to cause the actual increase of fibre length before this increased force is available. Muscle-fibre in relaxation will lengthen under a minimal force, but some distension force must bring this about.

Now general muscular exertion carries with it two factors: a demand for an increased blood-supply and a more rapid emptying of the veins, pressing the blood back towards the heart. Deepened respiration is another factor which is by no means insignificant. Immediately the return blood volume is increased, the amount taken into the heart in diastole is increased and in turn must and does increase the size of the muscular chamber, thereby increasing the length of each muscle-fibre and producing the one essential factor for an increased force of stroke and increased output volume. I believe that an appreciation of this automatic cycle is imperative for a due understanding of cardiac mechanics. The factor, then, in causing increased force of beat is the relative blood volume; in other words, the cardiac intake. Yet another factor is the force which a given mass of muscle can exert; this is very variable in different individuals and can be improved by training and use, and diminished by disuse and an unhealthy life.

Cardiac reserve, it now appears, may be expressed as the rise in force which accompanies a fixed degree of muscle lengthening, it being obvious that the heart muscle which gives maximum increase in force for minimal lengthening will always show the greatest reserve, other factors remaining equal. Variations in muscular capacity are apt to show themselves very clearly in the heart. The three outstanding processes affecting the efficiency of the cardiac muscle-fibre are: (1) Interference with the nutrition of the heart muscle—i.e., involvement of its blood-supply—i.e., disease of the coronary vessels. (2) Toxæmias: tobacco, possibly alcohol; influenza, and other toxic-infective diseases of which diphtheria is the outstanding example. (3) Inflammation of the heart muscle, as in the course of acute rheumatism, chorea, scarlet fever, and infective endocarditis.

There are two reasons why it is not easy to treat the after-effects of these damaging processes. In the first place, direct treatment to the heart muscle is not possible and any treatment must be indirect. Secondly, the heart is never given any rest: it cannot be put into one of those highly ingenious but far from ornamental glittering contrivances with which every orthopædic department in the country is littered. The inability to keep the heart at rest prolongs the toxic and inflammatory processes and renders recovery

* A paper read to the Incorporated Society of Massage and Medical Gymnastics.

desperately slow. Treatment to help the recovery process and to improve the muscular tone must be a general graduated muscular exercise; walking is the easiest and most suitable, at least in the early stages, and is the method most usually adopted. The length of time required, not less than 12 months, is also a factor requiring much consideration and careful management. Once a heart muscle has been damaged by such toxic or infective processes its efficiency is materially reduced. In the terms of our definition: in order to produce extra force the degree of muscle-fibre lengthening becomes greater than normal; hence the fibres are liable to become unduly stretched in the heart's attempt to fulfil its obligations. This, in the old nomenclature, is cardiac dilatation. When to the process of muscle damage are added all the ill-effects of leaking, damaged, or destroyed valves, the nature of the total process becomes even more apparent and more fully appreciated.

The Defective Pipes.

A faulty pipe may burst, or may become so silted up as to pass only a much smaller volume of water than when it was new. The result of the burst pipe is familiar in that pathetic group of hemiplegics, whose pipes to the master tissue, the brain, have given way, causing widespread damage to the delicate nervous tissue and leaving the patient paretic alike in mind and body, but showing little or no direct effect upon the heart itself.

The silting-up process—arterio-sclerosis—reacts upon the heart in at least three different ways: (*a*) The arteries are reduced in calibre and elasticity, and the actual work done by the heart in forcing the blood through them is definitely increased—in other words, the cardiac muscle-fibres must lengthen to accomplish the task and the heart hypertrophies, or at least becomes longer. (*b*) The arteries deliver less blood to the tissue capillaries, less in fact than they actually need; the tissues in time cry out for more blood and set in motion that neurohormonic reflex which determines the blood-supply to each individual tissue according to its needs; this throws a further effort upon the heart. (*c*) If the coronary vessels, supplying the heart muscle, are themselves involved, the unfortunate cardiac musculature is starved of blood and its nutrition impaired at the same time as it is called upon to make an increased effort, so that further lengthening of fibre is necessary, greater force must be expended, cardiac reserve is encroached upon, and with such a vicious circle breakdown is not far distant.

When we approach the question of the proper use of the blood-supply by the tissues the issue becomes somewhat more complex. The water-supply of London will not keep the population any cleaner unless they wash themselves and their clothes both frequently and efficiently. The blood-supply to a tissue will not save it unless the tissue—to put it simply—can take up oxygen and get rid of carbon dioxide. Now damaged tissues are unable to discharge their function, and may thus have a far-reaching effect upon the whole body. As a concrete example, the kidney damaged by an attack of acute nephritis has a much reduced functional capacity. Although adequately supplied with blood, it fails to keep either itself or its body clean. The ultimate result is as disastrous to the body as to the city where members fail to make use of their water-supply.

Drought.

The water pumps of this great city cannot send out water which it has not got, and a drought inevitably embarrasses the water-supply of the whole area. The same is true of the heart. The force of the heart beat can only be increased by a lengthening of the muscle-fibre, and this lengthening must increase the size of the cardiac chamber and can never be an active muscular action. It then follows that no increase in the force of the cardiac cycle can possibly be produced without an increase in the volume intake of the heart. This can only occur under two conditions: (1) the return volume of blood must be increased; or (2) the filling-time of the heart—i.e., its diastole—must be prolonged. Now effort is always associated with a rise in cardiac speed, and the filling-time must, therefore, be shortened and the return volume of blood must be increased. Teaching about the circulation in the past has omitted the very essential factor of how this comes about, and yet it is really a simple mechanical problem.

Ventricular contraction drives the blood into the arteries, pressure being maintained in diastole by the elastic recoil of the larger vessels: thus the blood is forced through the capillaries and is collected up in the venules. Very little positive pressure is left in the vessels when the blood has travelled this far. Muscular contraction compresses the thin-walled veins of the limbs, and the valves with which they are furnished determine a movement of the venous blood towards the heart. In the legs this is accomplished against the force of gravity, so that it must be easier in the arms. In the head and neck gravity helps the return of blood towards the heart, but the abdomen, which contains a high percentage of the total blood volume, does not lie in between contracted muscles, even if its veins were furnished with valves, which they are not.

Once again I must refer to physiological principles, to what is known as reciprocal innervation. It is manifest that a forcible contraction of the flexor muscles of the arm or leg can only be effective when there is simultaneous relaxation of the extensor group, and these paired groups are said to be reciprocally innervated because when one group contracts the other automatically relaxes. The diaphragm plays a very large part in respiration; its descent would be difficult to accomplish were the abdominal muscles held firmly contracted. There is much evidence that a process of reciprocal innervation associates the diaphragm with the abdominal muscles. If this be true, then it follows that when on inspiration the diaphragm contracts, producing a negative pressure within the thorax, at the same time the intra-abdominal pressure is raised to some degree by its descent. Meanwhile the abdominal muscles relax to some extent, so that the great abdominal veins are slightly compressed on the abdominal side while the intrathoracic pressure falls, and blood passes into the thorax. With quiet expiration elastic recoil is usually considered to be sufficient to account for the process, but immediately expiration is at all forced the abdominal muscles come into play and raise the abdominal pressure, thus forcing the diaphragm up into the thorax. Here, then, we have a very definite mechanism tending to return blood to the heart—in other words, to supply blood direct to those venous cisterns, the great veins, which deliver blood direct to the auricles for supply to the ventricles. The act of respiration is a very definite force which during inspiration draws blood into the thorax by negative pressure and during expiration raises the intra-abdominal pressure to the same end, but to a lesser degree.

It is common knowledge that muscular exertion deepens respiration, and that expiration becomes active rather than a mere passive recoil. Here we have again one of those nicely balanced mechanical arrangements with which natural phenomena in the body are so commonly equipped. Effort demands increased blood-supply; muscular contraction speeds up the blood return through the veins; respiration is deepened, increasing the thoracic suction power and raising the intra-abdominal pressure, thus driving the blood from the great abdominal veins into the thorax; the return flow of blood to the venous cisterns formed by the venæ cavæ fills them with blood; more blood passes into the auricle and is sent into the ventricle, thus causing an increased stretching of the ventricular wall, a lengthening of its muscle-fibres, and an increased power of stroke. In this way the output of the heart is increased both in speed and volume, and the tissues are served.

The venous cistern consists of all the great veins—cavæ, innominates, hepatic, and iliac—and is closed by six valves in pairs at the femorals, subclavians, and jugulars. In the lower animals there is a venous sinus, shut off from the auricles by valves, and it is highly significant that as we pass up the animal scale the disappearance of the sino-auricular valves coincides with the development of a diaphragm. There is therefore phylogenetic support for our belief that the return flow of blood to the heart's reservoir is a function of the diaphragm. The size of this reservoir is very great, and its capacity is estimated in man as 1400 c.cm. It can therefore be called upon to give an immediate response when effort is demanded of the heart.

This is not the only force attracting blood to the heart and acting to fill the heart chambers. The pericardium is a strong fibrous bag, and negative intrathoracic pressure can be shown to affect the pericardium and so cause aspiration of blood into the auricle. It probably does not act upon the ventricle, the walls of which are too thick and powerful. Further, each time the ventricle contracts and empties itself it must of necessity cause a negative pressure inside the pericardial sac, a pressure determined by its volume output; this ventricular emptying at each systole will automatically tend to fill the auricles, since they are thin-walled, are in diastole, and are enclosed within the fibrous pericardium. These, however, are small forces and are not of such great value in moving large volumes of blood. They probably only act upon the blood quantum in immediate juxtaposition to the auricles.

Cardiac Reserve under Conditions of Valvular Defects.

When the aortic valve becomes incompetent the ventricle contracts and drives a certain amount of blood into the aorta. During diastole a certain proportion of this blood escapes back into the ventricle, which also receives its usual charge of blood from the auricles. Thus more blood is pressed into the ventricular cavity, which in turn expands; the muscle-fibres are duly lengthened and an increased stroke-output results. In this way the regurgitant quantity of blood is compensated for, but the heart is working with a longer muscle-fibre; hence when call comes for increased

effort the heart is already to some extent stretched and has not as much reserve stretch left. Therefore the reserve of power is reduced in proportion to the degree of regurgitation, and the cardiac damage will reveal itself not as decompensation but as limitation of effort.

If the power of the individual muscle-fibre could be improved, if the total volume of the muscle could be adequately increased, if the heart muscle could be massaged and stimulated up to a material increase in power, to the level of the fine training of a first-class athlete, then the reserve power might be reinstated. The problem is the masseur's; how can the cardiac muscle be trained to a higher grade of efficiency? Carefully graduated exercises would seem to be the answer, but there may be another method. There are two very simple physiological experiments which may be carried out by anyone with sufficient muscular physique and mental force. If the intrathoracic pressure is raised by closing the mouth and nose and contracting the expiratory muscles against the air contained in the lung, the blood is dammed back from the thorax, the pulse becomes small, the heart shrinks, and the blood pressure falls. If, instead, with the same occlusion of mouth and nose a violent inspiratory effort is made and prolonged, the pulse enlarges, the heart expands, and the blood pressure rises. In each case the effort must be violent and prolonged to make the effects visible. If these extreme effects can be produced, then normal rhythmic deep breathing will do the same on a smaller and less dangerous scale. In this way it seems to me that the heart may be given just the type of exercises and training which it needs to help the muscle to reach a higher level of efficiency. The matter requires very careful thought and further careful work, and is by no means the simple problem which it seems.

In the first place, there is so much deficient and defective respiration among the general public that training in proper breathing would probably add materially to the well-being of a large portion of the population. Fortunately, the purely costal type of respiration which was fashionable amongst women 25 years ago has largely disappeared, but diaphragmatic respiration is neither free nor adequate amongst the girls of to-day. I cannot help feeling that here is a field of work which has not yet been adequately explored, and which might with advantage be considered and worked out.

POPULAR SCIENCE.

ANOTHER volume[1] has appeared of the "Science For You" series, which aims at giving the public readable accounts of recent scientific discoveries. It does it very well, and we imagine is at least as useful in keeping the different branches of science in touch with one another as in teaching laymen. The present instalment is a hotch-potch, and touches on cosmic physics, cold storage of apples, thunderbolts (still a mystery to everyone), Ramanujan the Indian mathematical wonder, the discovery of nebulium—*de omnibus rebus*, in fact, *et quibusdam aliis*. Nearly all of us would be the wiser for reading it.

THE ADVERTISEMENT OF MEDICINES IN HOLLAND.

AN organisation, whose full title is the Commission of Control on the Advertising of Medicines and Modes of Treatment, has been started in Holland recently as a result of representations in a Parliamentary Bill by dispensing chemists that the dispensing of medicines should be prohibited by all save members of their own body. The significance of the movement lies in the fact that in Holland dispensing chemists do not sell many of the preparations (apart from those connected with the toilet) which are generally sold by chemists and druggists in this country and in the United States. Manufacturing chemists, however, have looked askance at the action of the dispensing chemists, seeing in it a threat to their market in proprietary preparations. But as the interests of both were being equally prejudiced by the licence which certain advertisers were prepared to take if permitted by the journals which published their claims, a joint effort was decided upon by both classes of chemists concerned, and has resulted in the Commission of Control, which now has its headquarters in The Hague. The present secretary is Mrs. W. Coster Lemée, and the address is 176, Van Aerssenstraat, The Hague. The Commission has started work on a comprehensive and detailed plan to approve or disapprove of advertisements when submitted to them by those who are asked to publish them, and proposing advertisers also can, and do, submit drafts of their advertisements for advice. Further, the organisation has secured the coöperation of the police, so that if a proposing advertiser is known unfavourably to the penal authorities, the grounds for such knowledge can be obtained, and editors can be "put wise" in a practical way regarding new advertisers. The organisation is as yet in its infancy; it possesses no legal powers nor any regular source of income from the clientèle whom it desires to serve—namely, the proprietors of newspapers.

SOAP FILMS.

Mr. A. S. C. Lawrence has produced an excellent account of the experimental methods devised for the formation of soap films.[1] These range from the highly unstable dark films thought to be no more than a molecule thick to the stable varieties that Sir James Dewar preserved for hundreds of days. The author gives his book the sub-title "A Study of Molecular Individuality," and all the way through the text he presents this aspect of the things described. Many of these are phenomena of great beauty, needing the greatest care and ingenuity in their production. A most attractive feature of the book consists in the illustrative plates showing varied aspects of soap films, drops, and bubbles.

RAT DESTRUCTION.

THE author of an interesting and practical little book[2] names £100,000,000 a year as a modest estimate of the financial loss to the community of Great Britain alone from the depredations of rats and mice, quite apart from their function as disease carriers. He describes the difficulties of obtaining efficient legislation for rat destruction, owing to the general ignorance of the extent of the pest. Plague, rat-bite fever, spirochætal jaundice, human and pig trichinosis, melioidosis, and a certain tapeworm, *Hymenolepis diminuta*, are all distributed by this one animal or its parasites. Mr. Hogarth describes in detail all the more valuable methods of rat destruction, of which the most interesting, from a scientific point of view, is the Rodier method. It will be recalled that Mr. W. Rodier advises that the rats be caught alive, the females slaughtered, and the males released. If this proceeding is carried out on a large enough scale the reduction in the number of females will lead to persecution of the survivors by the males, and interference with breeding. Carried to sufficient lengths, this method would result in rapid extermination of the pest. The present plan of killing every rat which is caught tends to have the opposite effect, as the more adventurous male most frequently suffers, and the females become increasingly prolific. However, it is extremely difficult to persuade the average rat hunter to release his male victims alive. Flooding, smoking, ferreting, hunting with terriers, trapping, poisoning, and "virus," or the use of bait infected with organisms fatal to rats, are all discussed at length as methods of rat destruction, and the reader is advised how best to combine them in given circumstances. The book should not only be of practical value to those who suffer directly from the damage caused by rats, but it should serve as a reminder of the danger to the community from this source.

[1] Short Stories in Science. By J. G. Crowther. London: George Routledge and Sons, Ltd. 1929. Pp. 213. 5*s*.

[1] Soap Films. By A. S. C. Lawrence. London: G. Bell and Sons, Ltd. 1929. Pp. 141. 12*s*. 6*d*.

[2] The Rat: A World Menace. By A. Moore Hogarth, F.E.S. With preface by Sir Thomas Horder, Bart., K.C.V.O., M.D., F.R.C.P. London: John Bale Sons, and Danielsson, Ltd., 1929.

GUILD OF PUBLIC PHARMACISTS.—At 7.30 P.M. on Wednesday, Jan. 22nd, Dr. Adolphe Abrahams will address this Guild on the Human Machine: Its Efficiency and Limitations. The meeting will be at the Westminster Hospital, and Sir James Purves-Stewart will take the chair.

MEMORIAL TO SIR WILLIAM GLYN-JONES.—On Wednesday, Feb. 5th, at 3 P.M., Dr. Christopher Addison, M.P., will unveil a plaque which has been placed in the Examination Hall of the Pharmaceutical Society of Great Britain in memory of the late Sir William Glyn-Jones. Cards of admission are obtainable from the Secretary at 17, Bloomsbury-square, London, W.C.1.

UNIVERSITY OF BIRMINGHAM MEDICAL SOCIETY.—A William Haslam Oration has been instituted by the Society as a mark of its esteem and gratitude to the former dean of the medical school, Mr. W. F. Haslam. The first oration will be delivered in the medical theatre of the University at 8 P.M. on Monday, Feb. 3rd, by Prof. J. C. Brash, dean of the medical faculty, on the Surgeon Anatomist and the History of Anatomy. All past and present students of the school, and medical practitioners in the neighbourhood are invited to attend.